TECHNOLOGY DEPT.

the OIL AND GAS JOURNAL

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DETROIT

The little label with the big message

WHY do more than 1,000 manufacturers put this label on their products? Because it tells a story of *extra* value to every prospective buyer.

When a customer for your product sees the "Timken® Bearing Equipped" label, he knows he can count on dependable bearing performance. He knows that moving parts will last longer, work better, because they're held in proper alignment. He knows that friction is reduced to a minimum, maintenance and lubrication time cut. He's sure of extra years of service both in the bearings and in related assemblies.

The "Timken Bearing Equipped" label has come to mean all these things for two main reasons: the outstanding *performance* of Timken tapered roller bearings for more than 50 years; the widespread *acceptance* of Timken products throughout all industry.

If you make a product in which wheels and shafts turn, give it an extra sales feature by using Timken tapered roller bearings. And make the most of that sales feature by using the "Timken Bearing Equipped" label in advertisements, booklets, folders, and on the equipment itself. For help in making use of the "Timken Bearing Equipped" label write The Timken Roller Bearing Company, Canton 6, Ohio. Cable address: "TIMROSCO".

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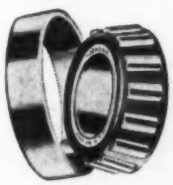
TRADE-MARK REG. U. S. PAT. OFF.
TAPERED ROLLER BEARINGS



NOT JUST A BALL ○ NOT JUST A ROLLER ▭ THE TIMKEN TAPERED ROLLER ▱ BEARING TAKES RADIAL ⓘ AND THRUST →ⓘ← LOADS OR ANY COMBINATION →✳←

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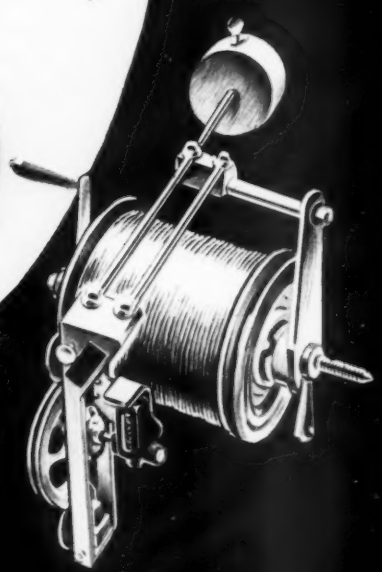
FOR ACCURATE DEPTHS COUNT ON HALLIBURTON

HOWCO measuring devices have been developed during the past 25 years to provide precision in the placement of cement under any and all conditions. Accurate beyond any other known method, they are accepted as the standard of exactness in determining depths wherever that factor is vital. For speed, simplicity and adaptability, oil operators the world over continue to *count on Halliburton* measuring devices *for accurate depths.*

HOWCO measuring devices are an essential part of your drilling equipment...useful every day in trimming your *"margin-for-error"* to a negligible "hair-line"! Let your HOWCO representative describe and recommend the type of HOWCO measuring equipment best suited for your problems...CALL HIM TODAY.

"There's no substitute for experience in oil well cementing"



HOWCO MEASURING DEVICES

HALLIBURTON OIL WELL CEMENTING COMPANY

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The BREEZE is a double-duty unit

rotary drilling and workover ...use it for both

The Bethlehem BREEZE seldom sits around waiting for something to do. Its owner rarely gives it a breathing-spell. For this is a dual-purpose rig, designed for *both* shallow drilling and medium-to-deep workover jobs.

The Breeze is powerful, versatile, smooth—so simple to run that the driller often gets the "touch" in a matter of minutes. Standard equipment includes the Bethlehem Hydrodrive transmission and self-adjusting clutches. And it's air-controlled throughout—something appreciated most by the man behind the levers.

In field service, under many different conditions, this sturdy portable rig has proved itself an outstanding performer. If you're looking for a trouble-free outfit . . . one that's always Johnny-on-the-spot . . . investigate the Breeze. We'll be glad to supply full details at your convenience.

BETHLEHEM SUPPLY COMPANY

General Offices: 21 E. Second Street, Tulsa, Okla.

Subsidiary of Bethlehem Steel Corporation

On the Pacific Coast Bethlehem Oil-Field Equipment is sold by Bethlehem Supply Company of California. *Export Distributor:* Bethlehem Steel Export Corporation

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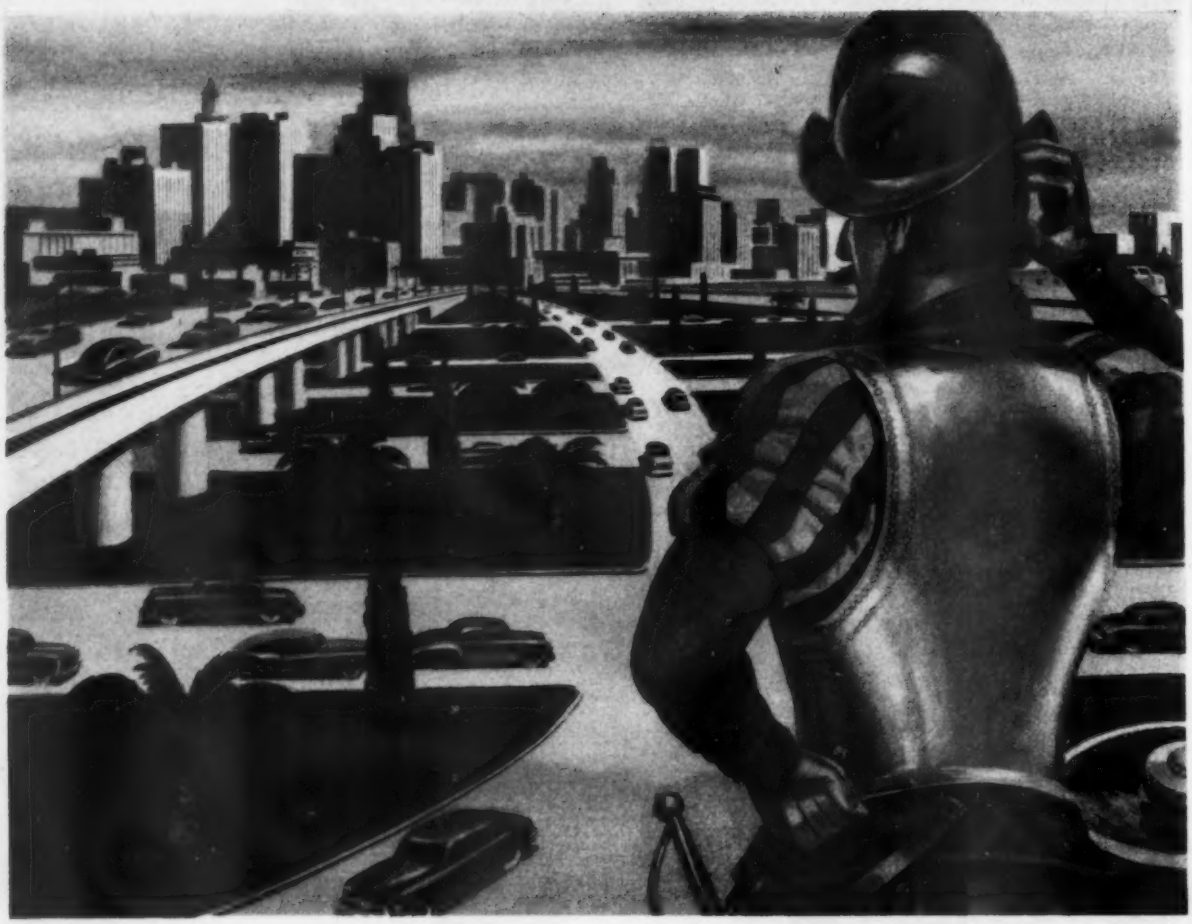

"DIABLO," SAID DE SOTO, "HOW THIS HOUSTON TOWN HAS GROWN!"

For more than thirty years it has been apparent to far-seeing business management that the Southwest was destined to become one of the great industrial areas of the world. Natural resources, temperate climate, and an ambitious people laid the groundwork; the growing decentralization policy has accentuated progress.

If your organization's plan includes capitalizing on the vast resources of the Southwest . . . it will benefit you to take advantage of Brown & Root's years of experience in this territory. A complete knowledge of soil, terrain, and climatic conditions may result in faster, more economical completion of your contemplated project. A request from you will put Brown & Root consultants at your service.

B Engineers · Constructors

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You get MORE CAPACITY *with a* FANMIX BURNER

Increase Boiler Ratings On Present Or Planned Equipment

In all types of Coppus-Dennis **FANMIX** Burners — straight gas or combination gas-oil — we utilize the energy of the fuel under pressure to drive the burner fan and deliver air in the proper proportion to the fuel flow. This exclusive "pinwheel action" *mechanically* mixes fuel and air in exactly the right proportions for truly radiant, non-luminous heat.

The result is uniform temperature everywhere in the combustion chamber — no drifting "hot spots" — and complete combustion under all conditions. That's why you can release more heat into your present furnace — why in new installations you get more heat into smaller furnace space.

FANMIX Saves On Both Old and New Installations

FANMIX can easily be operated with your present furnace and stack, requiring only minor changes in other equipment. Or if you're planning on new boilers, remember that **FANMIX** relieves the furnace from the burden of mixing, creates its own forced draft and takes smaller pipe sizes. Which means you can plan on reduced combustion space, less stack, no forced draft equipment and lower installation costs all around.

Get the Whole Story

Coppus engineers **FANMIX** Burners to meet individual requirements, providing complete control over heat pattern and combustion . . . Learn more about how "pinwheel action" can step up *your* boiler performance to peak efficiency and economy — as it is doing throughout industry. Send for Bulletin 410-6. Coppus Engineering Corp., Worcester 2, Mass. Sales Offices in THOMAS' REGISTER. Other Coppus "Blue Ribbon" Products in BEST'S SAFETY DIRECTORY, CHEMICAL ENGINEERING CATALOG, REFINERY CATALOG, and MINING CATALOGS.

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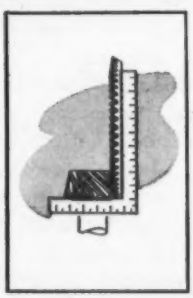
Spicer engineered

for a long, quiet life...

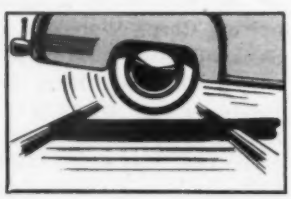
Spicer Salisbury Axles for passenger cars and light commercial use



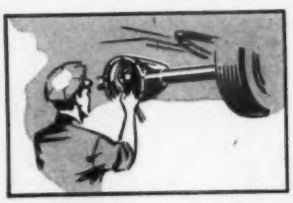
RIGIDITY—The special Spicer design and construction maintain accurate alignment of gears and bearings under all speeds and loads, assuring continued quiet operation.

LUBRICATION—Scientifically developed control of oil circulation provides a constant, correctly proportioned flow to all gears and bearings for effective lubrication and cooling.

RUGGEDNESS—Sturdily constructed to withstand the high speeds and extremes of punishment which are common in modern automotive vehicle operation.



ACCESSIBILITY—Extremely easy to get into for inspection of parts. Simple-to-remove gear cover, oil level and drain plugs reduce service time and costs.



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SPICER MANUFACTURING
Division of Dana Corporation
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Transmissions • Passenger Car Axles • Clutches • Parish Frames • Stampings • Universal Joints • Forgings
Torque Converters • Propeller Shafts • Spicer "Brown-Lipe" Gear Boxes • Railway Generator Drives

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Piping for every refinery installation ...from one complete line...CRANE

SEVERE SERVICE SUITS THESE CHECK VALVES

Rugged, yet unusually compact, Crane 600-Pound Forged Steel Lift Checks are made specifically to withstand severe service on high pressure, high temperature steam and oil lines. Famous Crane Quality in design, materials and workmanship assures maximum strength and longer valve life.

Crane forged carbon steel valve body—reinforced with heavy metal sections—provides a high margin of safety. Both the seat and disc are made of wear-resisting Exelloy. The high-lift disc operates in a specially designed cap that assures proper guiding, square seating, and eliminates destructive chattering. For further information, see your new No. 49 Crane Catalog, p. 248-9.

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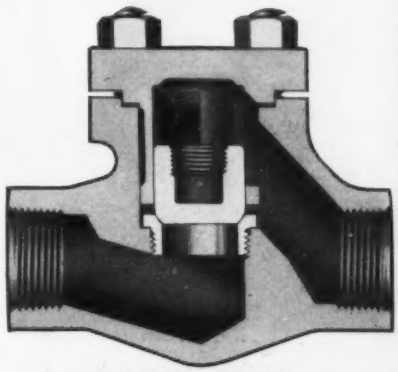
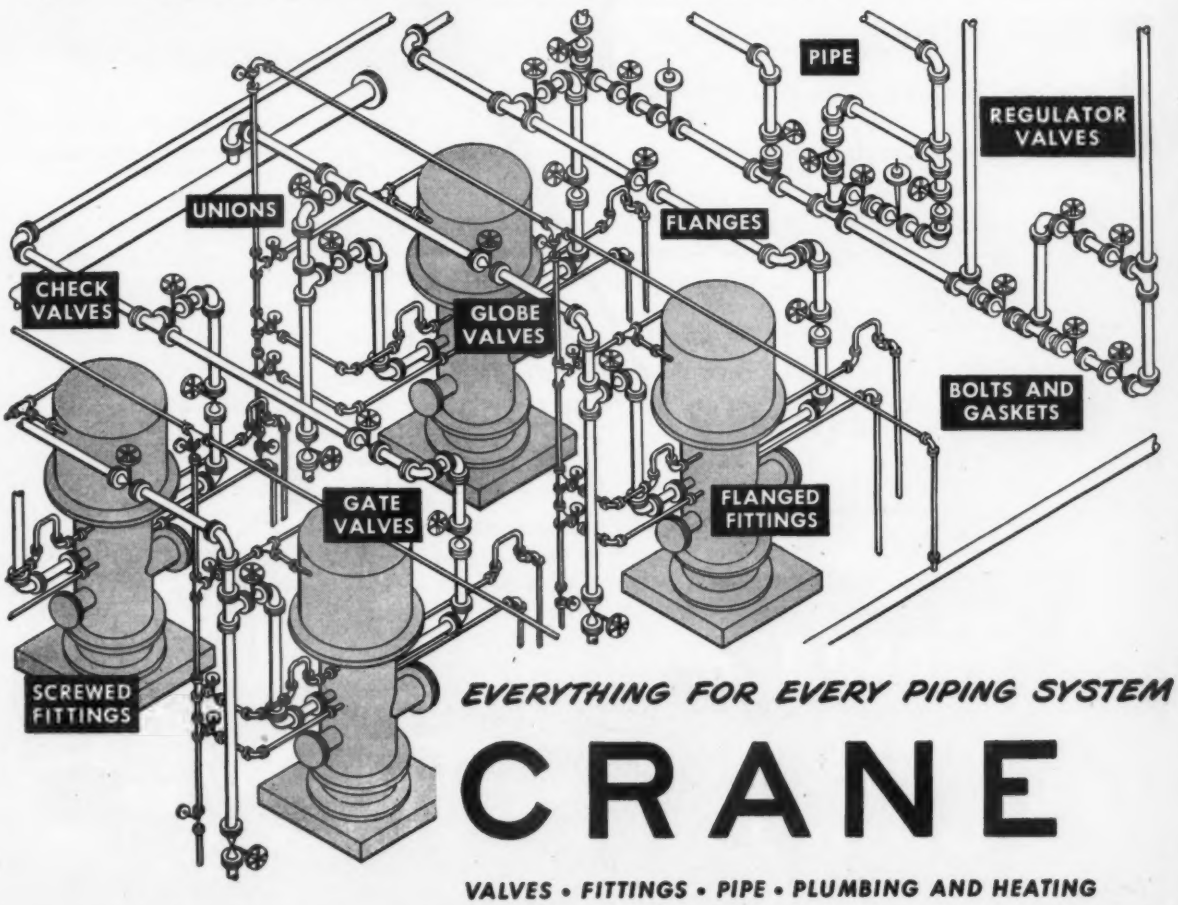


Horizontal Check—Bolted Cap. For oil or oil vapor services up to 1000° F.; for steam up to 850° F. and for water, air or gas. Sizes: ½ to 2 in. Screwed, flanged or welding ends.

ONE ORDER TO CRANE COVERS ALL PIPING EQUIPMENT NEEDED FOR THESE GLAND OIL AND COOLING WATER LINES



EVERYTHING FOR EVERY PIPING SYSTEM

CRANE

VALVES • FITTINGS • PIPE • PLUMBING AND HEATING

The Oil and Gas Journal, published Thursdays by The Petroleum Publishing Company. Entered as second-class matter September 1, 1910, at post office at Tulsa, Okla., under act of March 3, 1879. U. S. and foreign rates to the petroleum industry, $3 yearly. Copyright 1950.

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in SNYDER with Pipe,
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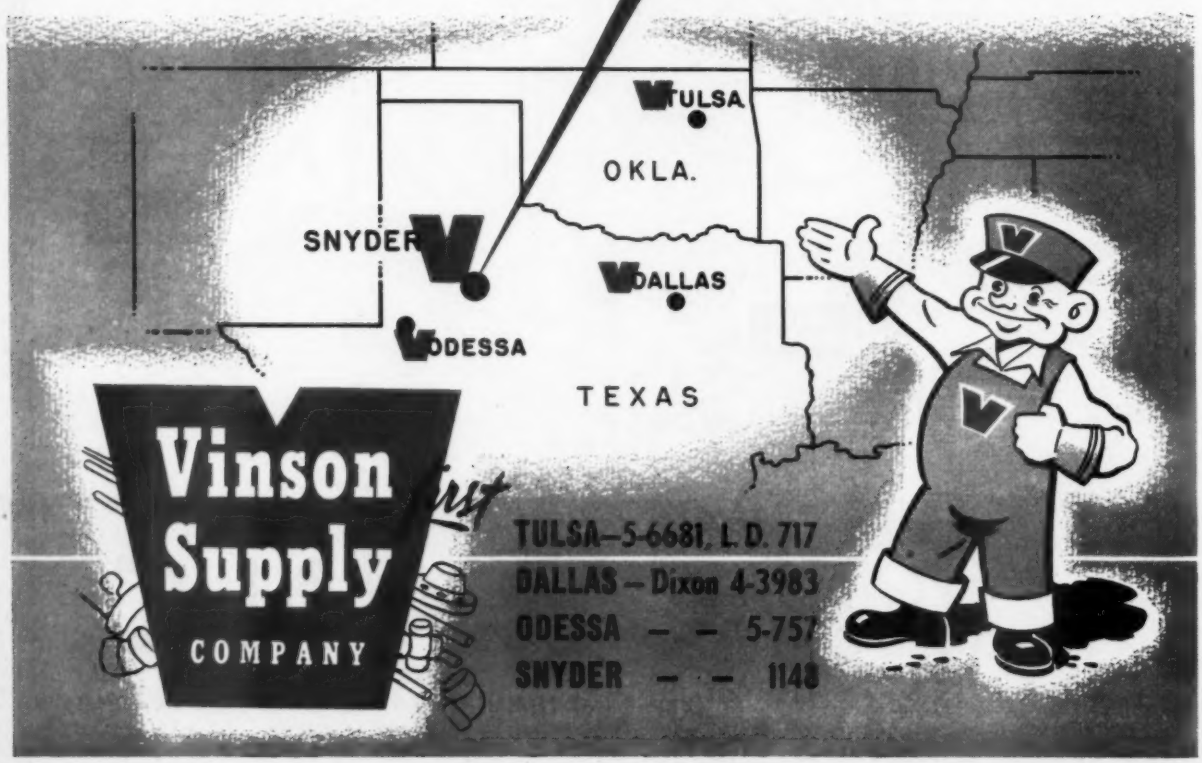
VINSON STOCKS THE BIG 6 IN ALL FOUR STORES . . .

- CRANE Valves & Fittings
- NORDSTROM Plug Valves
- NATIONAL Pipe & Steel Tubes
- LADISH Welding Fittings & Flanges
- FISHER Control Equipment
- CHASE Brass Condenser Tubes

This new Vinson Warehouse-Store, Snyder, Texas is fully stocked. Make this store your supply headquarters.



KOPPERS K-SPUN POROUS CHROME* RINGS

boost pump service 2½ times!

Pasotex Pipeline Co., *El Paso, Texas, pumps approximately 2000 barrels of crude oil per hour at 600 psi through this field installation of three Gaso Pump units. Pumps are equipped with moly iron liners and cast iron pistons with Koppers K-Spun Porous Chrome Piston Rings. Liners are interchangeable to permit varying capacities and working pressures of pumps.*

GASO PUMP CO. *Cuts* cylinder wear—*Doubles* pump service—*Slashes* maintenance costs—with KOPPERS Piston Rings

Here's a job that's really hard on pumps—and piston rings! Thousands of barrels of pipeline crude oil go through these rugged Gaso Pumps . . . carrying with it abrasives and other impurities that constantly grind away at cylinder walls and piston rings. But amazing new Koppers K-Spun Porous Chrome Piston Rings take this rough, tough service right in their stride . . . *lasting more than twice as long as ordinary rings!* And that's not all . . . Koppers Rings *decrease cylinder wall wear up to* 50% in the bargain!

Here at last are the piston rings that cut "*down time*" and maintenance costs *in half* . . . lengthen the life span of expensive equipment . . . boost production and profits to a new high! Check into the operating costs of *your* equipment today . . . and next time you overhaul, specify Koppers Piston Rings . . . then watch costs go *down,* service go *up!*

Koppers complete engineering facilities are at your service. Whatever your piston ring problem may be, we're equipped to help you solve it quickly and economically. Write for information to: KOPPERS COMPANY INC., *Piston Ring Department,* 1558 Hamburg St., Baltimore 3, Maryland.

**Van der Horst process*

WHAT IS KOPPERS K-SPUN?

Koppers K-Spun is an entirely new type of ring iron created by an exclusive centrifugal casting process, which forms graphite into large nodules instead of fine flakes. Large graphite nodules in K-Spun cast iron eliminate the many planes of weakness inherent in ordinary cast iron . . . impart to K-Spun *100% more strength, 50% more elasticity, four times more shock resistance!* K-Spun Rings are guaranteed not to break in installation or in service! Available up to 12⅜" diam.

WHAT IS KOPPERS POROUS CHROME?

Koppers Porous Chrome is a chrome-plated ring with a *porous surface* that holds and distributes oil during break-in, quickly wears down to perfectly seated *solid chrome* that prevents grit or other particles from imbedding themselves in the ring surface and scratching cylinder walls. Porous Chrome Rings last up to four times as long as ordinary rings, reduce cylinder wear 50% or more! Available in any size on specification in quantities of 100 or more.

KOPPERS

KOPPERS PISTON RINGS

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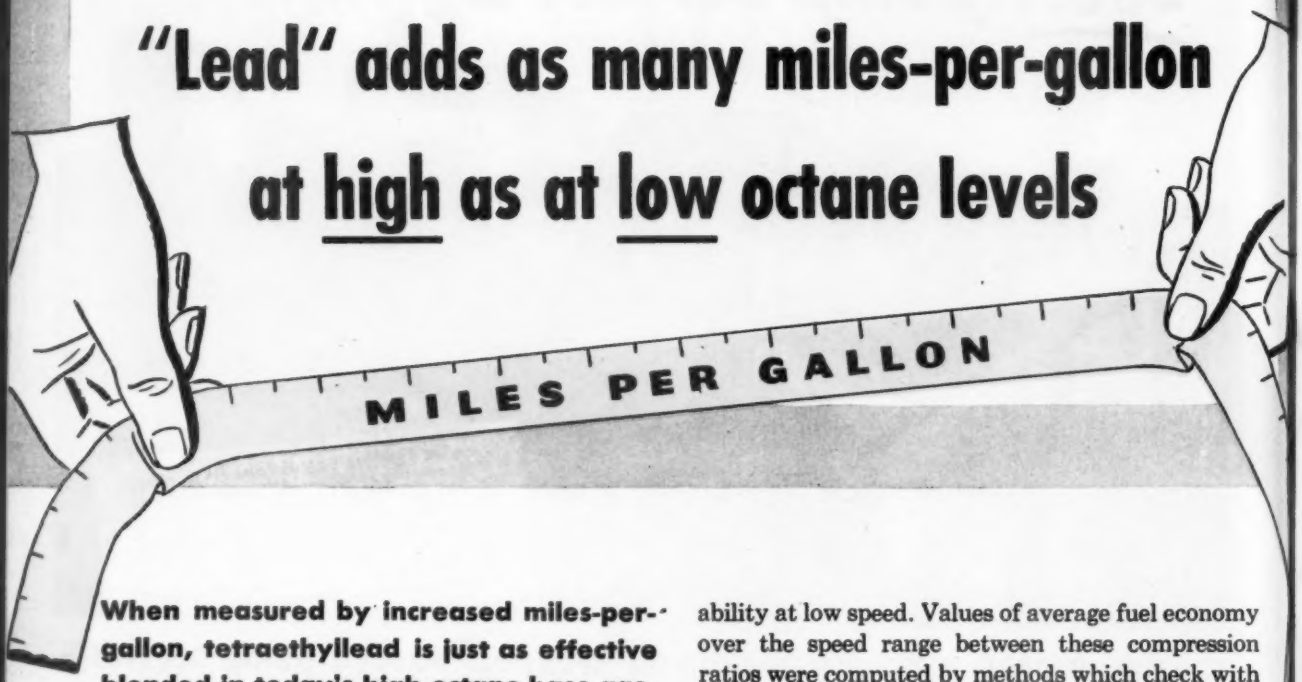
"Lead" adds as many miles-per-gallon at high as at low octane levels



When measured by increased miles-per-gallon, tetraethyllead is just as effective blended in today's high octane base gasolines as in the lower octane gasolines of the past.

THERE has been a remarkable increase in the antiknock quality of base gasolines since "Ethyl" antiknock compound was first marketed in 1923. Despite this large increase in the octane number of base gasolines, tetraethyllead is just as effective as ever from the standpoint of the extra miles-per-gallon it can contribute.

The charts show data obtained in tests made at 6.1 and 8.5 compression ratios on an automobile equipped with an overhead valve engine, and with axle ratios selected to provide equal acceleration ability at low speed. Values of average fuel economy over the speed range between these compression ratios were computed by methods which check with experiment.

Chart No. 1 shows that permissible increase in compression ratio per octane unit becomes larger as the octane number of the fuel is raised, and shows that octane numbers at the higher levels are increasingly effective in the improvement of gasoline economy on the road.

From 6.1 to 8.5 compression ratio (corresponding to an increase in octane number from 78.3 to 95) miles-per-gallon of fuel are boosted by approximately 19%. In contrast, the air cycle efficiency increases only about 11% over the same range of compression ratio.

In Chart No. 2 the gasoline mileage curve of the lower chart is repeated. On the curve, the two circles show the improvement contributed by 3.0 cc tetraethyllead when added to a base fuel of 78.3 octane number. The two squares show the gain from 3 cc tetraethyllead when added to a base fuel of 86 octane number. *The additional miles-per-gallon* are substantially the same in the two cases.

Thus, when tetraethyllead is added to commercial fuels, it is just as effective for improving fuel economy on the road at today's high octane levels as at the lower octane levels of the past.

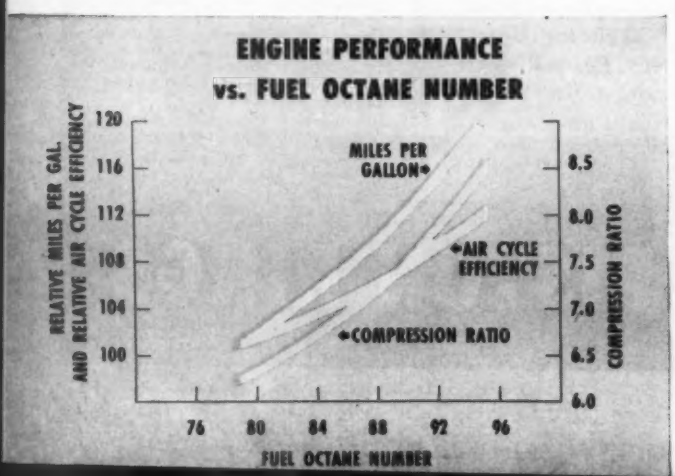


CHART 1. The improvements, per octane unit, of air cycle efficiency, miles-per-gallon and permissible compression ratio become greater as the antiknock value of the fuel is increased.

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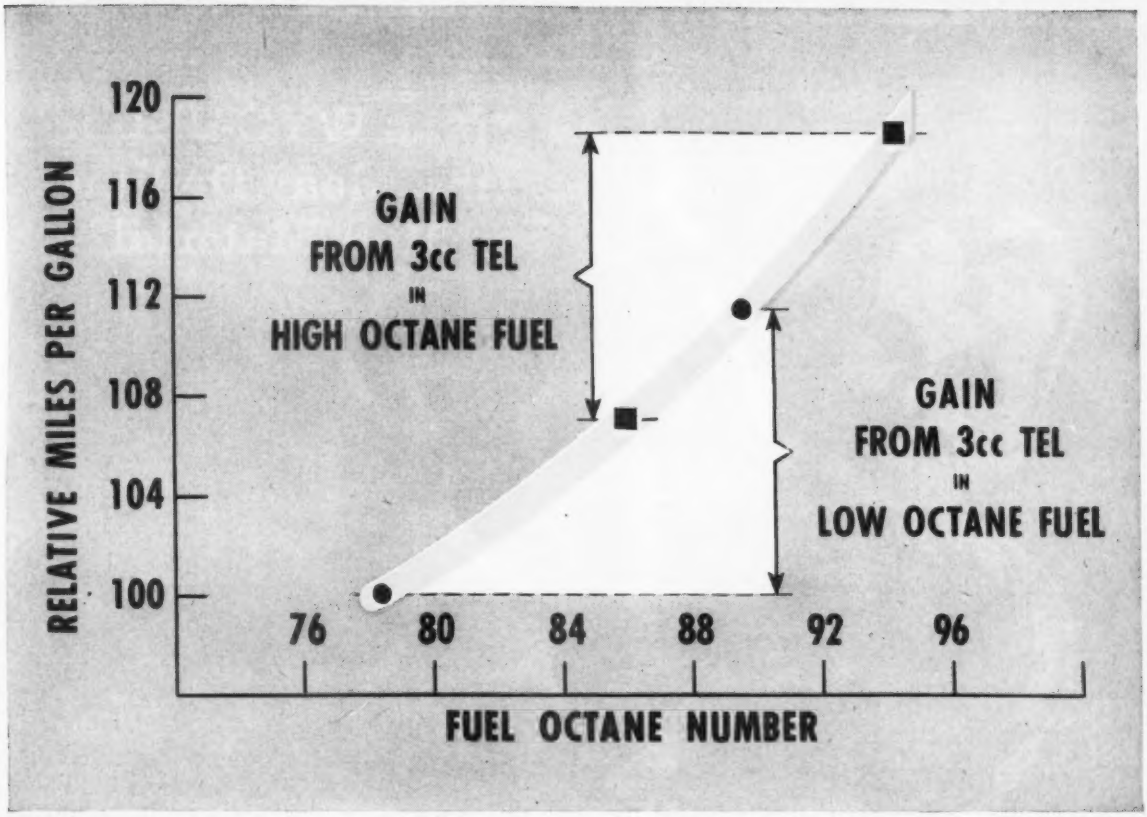

CHART 2.

Research has indicated that some types of hydrocarbons in the higher octane range are unusually responsive to additions of tetraethyllead. The production and use of such stocks in the future may bring substantial economies in the manufacture of gasolines of high antiknock quality.

Future messages will cover the relation of the chemical composition of gasolines to the effectiveness of tetraethyllead.

Members of the Ethyl research staff are pleased to discuss these findings with refiners who are formulating long-range research programs.

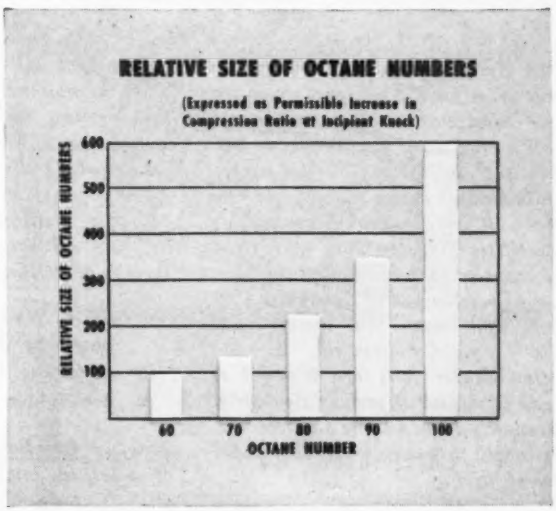

CHART 3. This chart shows that the units going up the octane scale become larger and larger in terms of permissible increase in compression ratio.

Over 400 specialists working full time on fuel and engine development

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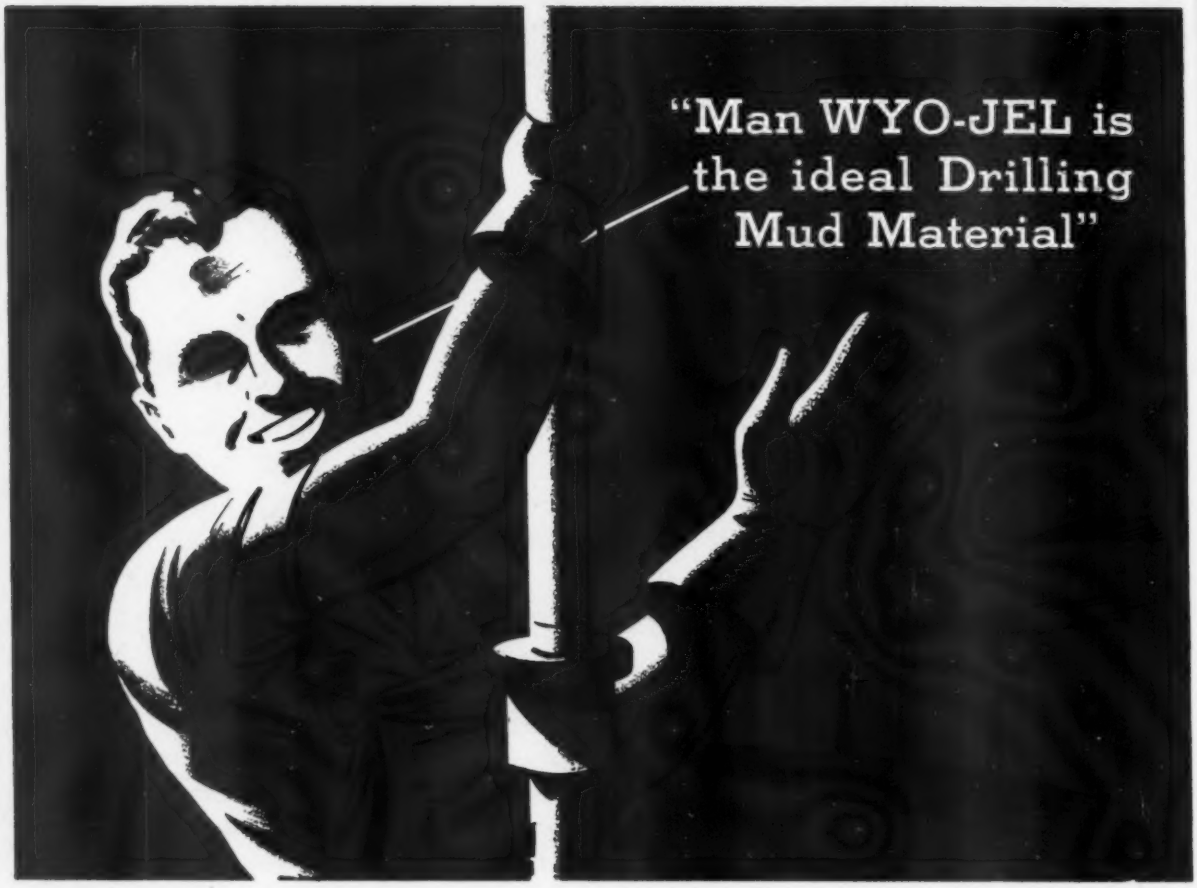

"A drilling man like me knows what gives mud a pedigree or as we say — mud with a college education.

"We must keep mud uniform and fluid and the use of Wyo-Jel makes this task much easier . . . also saves us money. Wyo-Jel absorbs tremendous quantities of water and will yield (guaranteed) a minimum of 100 bbls. of mud per ton (at 15 Centipoise Viscosity, with very low water loss). That's a yield, believe me.

"Our dealer tells me Wyo-Jel is made from pure Wyoming Bentonite. Personally I like its fine particle size, the swell suspending qualities and ease of mixing.

"In fact all of the mud users, drillers, mud engineers, tool pushers and drilling superintendents of my acquaintance, recognize Wyo-Jel as an Ideal Drilling Mud Material. They consider it a decided help in reducing drilling costs, increasing drilling efficiency and lengthening the life of drilling mud."

Order Wyo-Jel from your dealer or distributor. Ask us for the folder showing Rotary Mud Tests.

Dealers Attention: If you do not stock Wyo-Jel, we invite you to do so.

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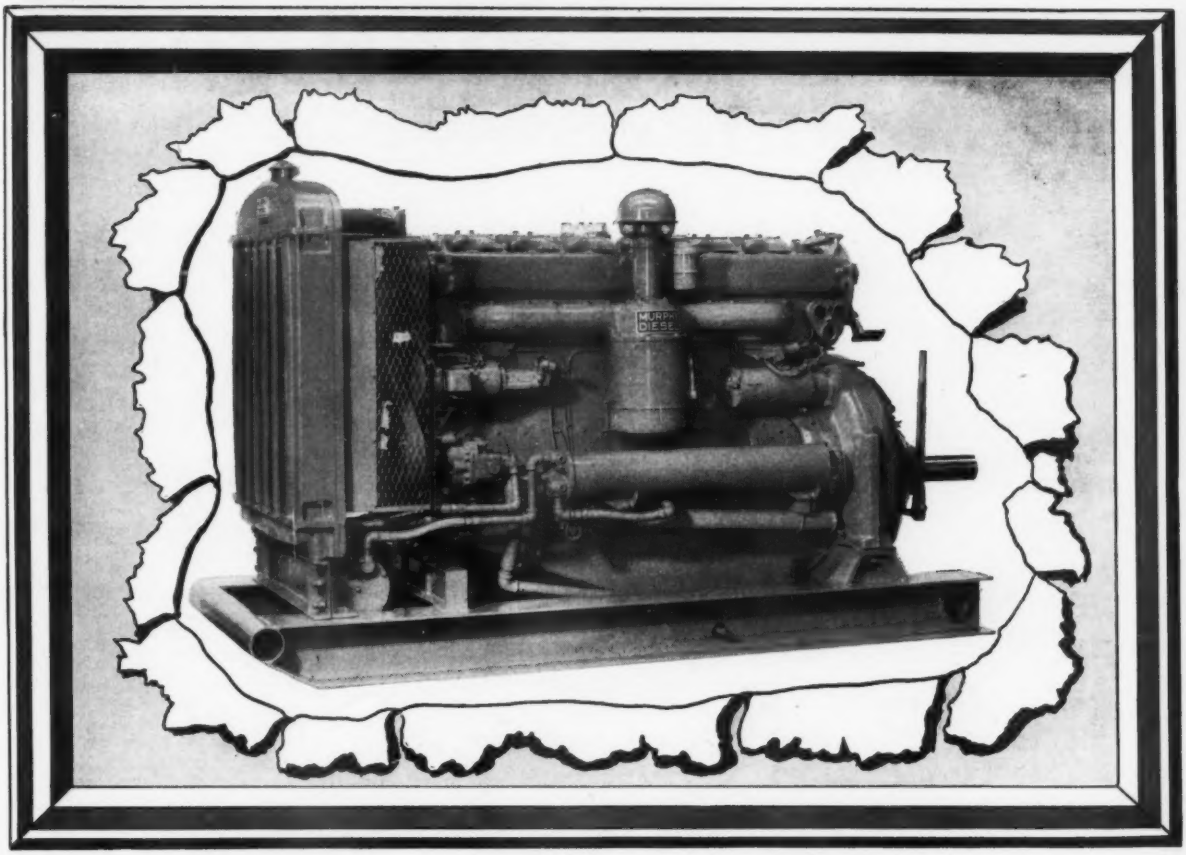

Break into the *Profit Picture* with MURPHY DIESEL POWER

ONE of the most important keys to profitable operation is economical, dependable power — the kind of power you get from Murphy Diesels. Because it is a "true" diesel with unit fuel injection, the Murphy Diesel uses *less fuel per horsepower hour than any other engine of comparable power rating.* Because the design is simple and all working parts are built to last, the Murphy Diesel is dependable.

Put Murphy Diesel economy and dependability to work for you. You'll like the improvement it makes in your profit picture. Ask your Murphy Diesel Dealer for full details or write direct.

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Heavy duty power
for the oilfields

Murphy Diesel Engines and Power Units for drilling and pipe line pumping, 90 to 220 H.P. Diesel Electric Generator Sets 60 to 133 K.W.

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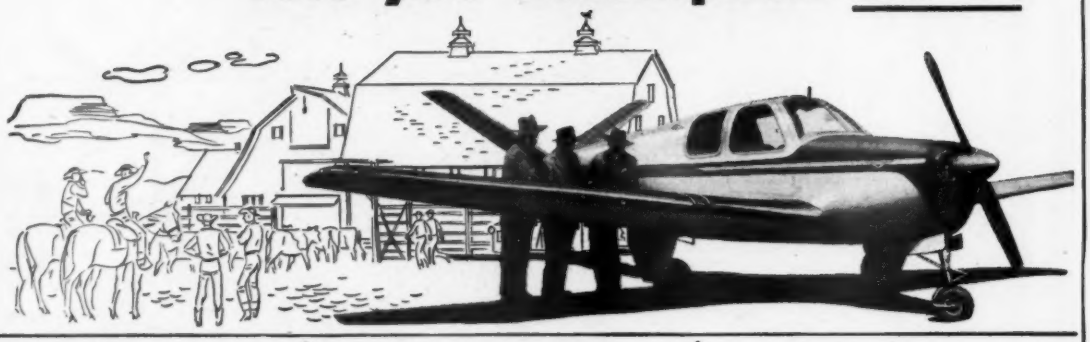
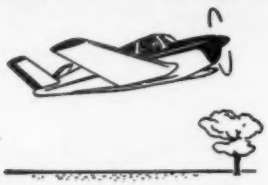
On the go? This Beechcraft

lets you accomplish more!



Speed and Top Performance

Because you cruise at 170 mph, all the travel time you formerly wasted is put to *profitable* use. You measure trips in hours, not days. The Bonanza's 750-mile range gives you mobility of action.



Short Field Performance

. . . because of these features: Take-off horsepower rating now 196 hp at 2450 rpm. New Beechcraft propeller has greater static thrust. Action of retractable landing gear has been speeded up.

Solid In-Flight Comfort

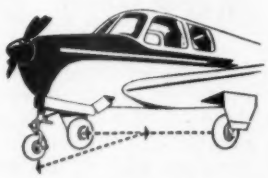
Luxuriously appointed cabin carries four with plenty of "stretching room." Quiet soundproofed cabin lets you arrive ready for action. Luxury touches: arm rests, ash trays for all, three map pockets.

Extra Space When Needed

Want more cargo space? Rear seats are easily removable in 3 minutes. Regular luggage compartment accessible from inside or out. There's even a cabin coat hanger rod to carry clothes wrinkle-free.

"Passenger Car" Economy

Since the Bonanza uses only 56% of the engine's rated take-off horsepower, there's less engine strain, fewer overhauls. And upkeep is exceptionally low. You use only 9½ gallons of fuel per hour.



It's *Strong* on Safety

Sturdy, low cross-braced landing gear with its wide tread and long wheel base makes rough field landings easy. Rugged all-steel frame far surpasses shock and stress requirement tests of CAA.

There's much more to tell about this versatile, economical business plane. For the full story on the revolutionary Model B35 Beechcraft Bonanza, contact your nearest Beechcraft distributor or dealer. Or for more details, write Beech Aircraft Corporation, Wichita, Kansas, U.S.A., on your company letterhead today.

Top speed, 184 mph
Cruising speed, 170 mph
Range, 750 miles
Fuel economy, 9.5 gph

Beechcraft
BONANZA

BEECHCRAFTS ARE THE AIR FLEET OF AMERICAN BUSINESS

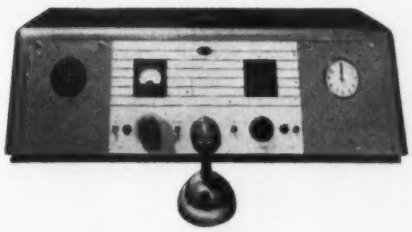
PROVED *in every service*

RAYTHEON FM MOBILE RADIOPHONE

In fire and police service; in the rough and rugged going of forestry, and construction work; along oil, and gas pipe lines; on the highways and in jangling city traffic . . . Raytheon Radiophone has proved its remarkable dependability and adaptability. For ease of installation, for simplicity and economy of operation, for clarity of reception and freedom from adjacent channel interference, Raytheon Radiophone provides the finest in mobile and fixed station equipment. Write today for complete information. Use the coupon below.

NEW MODEL UM 30 MOBILE UNIT

- Available in both single and dual channel models covering the entire 152-174 mc. frequency range.
- Requires less space — easier to install.
- Lowest battery drain — no special batteries or generators required.
- Meets all new F. C. C. requirements including adjacent channel operation and modulation limiting (deviation control).
- Furnished complete with all accessories.



COMPLETE BASE STATION EQUIPMENT

- Complete transmitting-receiving equipment for 30 or 60 watt base station systems.
- Designed throughout for maximum convenience, efficiency, ease of operation and simplified maintenance.

Model US 60-1-LC control console (shown above) contains every desirable feature of a fixed station control unit. Equipment for wall or rack mounting also available.

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Excellence in Electronics

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MANUFACTURING COMPANY
WALTHAM, MASSACHUSETTS

Sold Exclusively in Canada by Canadian Marconi Co., Marconi Bldg., St. Sacrament St., Montreal

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MAIL THIS COUPON TODAY!

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Raytheon Manufacturing Co.
Waltham 54, Massachusetts

Please send complete information on Raytheon Mobile Radiophone:
Model UM 30 (30 watt) Mobile Unit
Model US 30 (30 watt) Base Station Equipment
Model US 60 (60 watt) Base Station Equipment

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ADDRESS .....

CITY .....ZONE.....STATE.....

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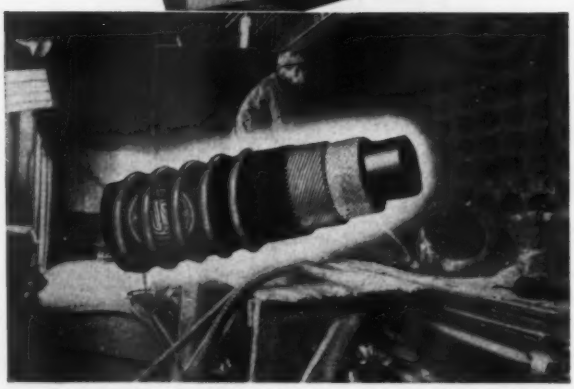
3 ROUGHNECKS FOR THE OIL REFINERY

Just a few of the dozens of U. S. Rubber Hose that keep production moving in a cost-conscious business

FOR FIRE PROTECTION in refineries, chemical and acid plants, use "U. S." MATCHLESS CARBOLIZED FIRE HOSE. It is also widely used for street cleaning, sewer flushing, paving and other services. The tough tube, the cover and the capped ends protect the carcass from the action of oils, acids, mildew and rot. Withstands 400 pounds test pressure. Black or white neoprene cover protects against sun checking.



FOR CONDUCTING STEAM OR AIR to operate a cleaner in cleaning interiors of still tubes in oil refineries, use "U. S." GIANT STILL CLEANING HOSE. This is the most economical hose where tubes are cleaned when fairly hot, and external heat is a factor. Oil-resistant tube and cover. For air pressures averaging 100 to 125 pounds.

WHEN YOU'RE HANDLING saturated steam pressures up to 200 pounds, pick "U. S." MATCHLESS STEAM HOSE, because *it cannot burst*. If after long service, steam finally penetrates the inner lining of MATCHLESS, the steam merely seeps through the cover, which has become porous, indicating that a replacement should be made.

Bring your problems about hose to the research and design staff of United States Rubber Company. They can show you how to make the best selection, how you can lower your operating costs, increase production. Write to:

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U.S.RUBBER

SERVING THROUGH SCIENCE

UNITED STATES RUBBER COMPANY

MECHANICAL GOODS DIVISION • ROCKEFELLER CENTER, NEW YORK 20, N. Y.

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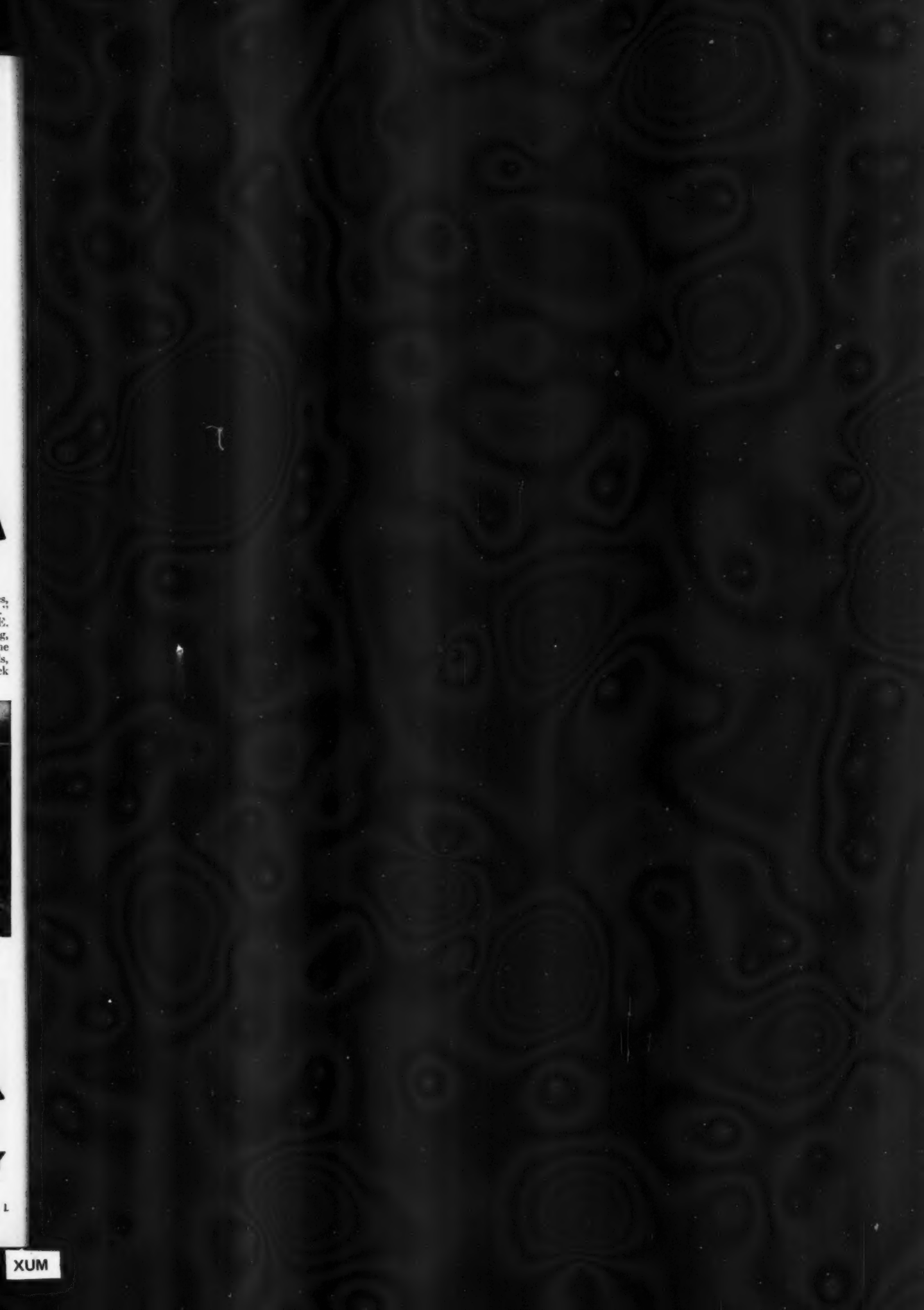

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Presenting

THE NEW

EMSCO D-850

DUPLEX POWER SLUSH PUMP

Here's a pump designed to meet the specialized requirements of deep drilling. A duplex power pump that gives you a combination of pressures and volumes heretofore unobtainable. No longer do you need to employ costly, complex systems for compounding two power pumps. No longer is it necessary to lose drilling efficiency due to the pressure and volume limitations of ordinary slush pumps. The D-850 incorporates many new and exclusive features which insure maximum efficiency and an absolute minimum of maintenance. It will pay you to investigate the D-850—the newest addition to the world-famous, field-proven Emsco line of all-steel "D" Series Power Slush Pumps.

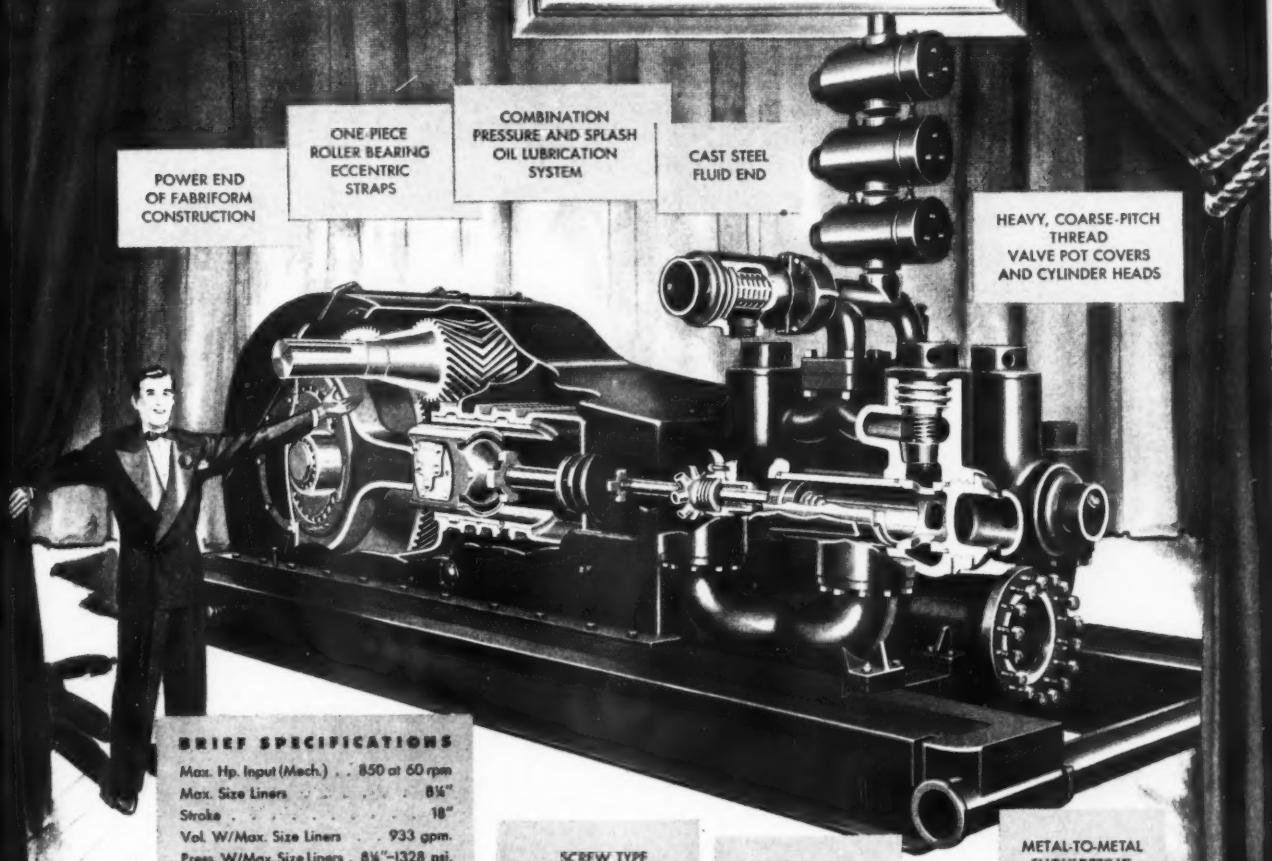
POWER END OF FABRIFORM CONSTRUCTION

ONE-PIECE ROLLER BEARING ECCENTRIC STRAPS

COMBINATION PRESSURE AND SPLASH OIL LUBRICATION SYSTEM

CAST STEEL FLUID END

HEAVY, COARSE-PITCH THREAD VALVE POT COVERS AND CYLINDER HEADS



BRIEF SPECIFICATIONS

Max. Hp. Input (Mech.)	850 at 60 rpm
Max. Size Liners	8¼"
Stroke	18"
Vol. W/Max. Size Liners	933 gpm.
Press. W/Max. Size Liners	8¼"–1328 psi.
Press. W/Min. Size Liners	6"–2680 psi.

SCREW TYPE STUFFING BOX GLANDS

LINERS PACKED AT BOTH ENDS AND EXPOSED TO VIEW

METAL-TO-METAL SHOULDERING OF LINERS

EMSCO DERRICK & EQUIPMENT COMPANY

Houston, Texas • LOS ANGELES, CALIFORNIA • Garland, Texas

NEW BULLETIN ★ Bulletin F-170 describes and illustrates the new Emsco D-850 Slush Pump. Your letterhead request will receive prompt attention.

EMSCO

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HERE IT IS!

Fig. 3639-3678 Self-Priming Centrifugal

Goulds NEW Self-Priming Pump

Only GOULDS gives you all five of these outstanding advantages

1. Absolutely no valves of any kind in pump—nor are any needed in installation. Liquid can drain out of discharge and suction line through pump without affecting priming ability.
2. No recirculation of liquid after completion of priming action.
3. Efficiencies comparable to quality straight centrifugal pumps are thus obtained.
4. Positive fast-acting self-priming similar to priming ability of positive displacement pumps.
5. No large or bulky priming chambers or reservoirs, providing a compact unit at low cost.

APPLICATIONS:

Any service where suction lifts are encountered. Particularly adaptable for automatic service or where liquids to be pumped contain air or gas. Pump will automatically free itself of air and positively will not vapor lock.

Open impeller type. Sump service • Sewage effluent • Marine-bilge pumping, etc. • Mine gathering and dewatering • Dewatering excavations, cellars, etc.

Enclosed impeller type. Cold and hot water • Low pressure fire service • Pumping from underground supply • Irrigation • Sprinkling • Engine jacket cooling water service • Volatile liquids and light oils • Ice core sucking.

SIZES—CAPACITIES AND OTHER FEATURES

39 Models and Sizes

¼ to 5 H.P. ratings

Open and enclosed impellers

Capacities to 120 G.P.M.

Heads to 135 ft. depending on capacities

Suction lifts to 25 ft.

Also available in Flexible coupling motor drive or belt drive and close-cupld gasoline engine-driven unit.

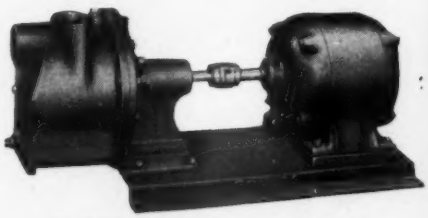

Fig. 3739-3789 Flexible coupling type drive

Patents Pending

FOR FULL DETAILS WRITE FOR BULLETIN 636.1

MEMBER HYDRAULIC INSTITUTE

Goulds PUMPS INC. Seneca Falls New York

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PARTS
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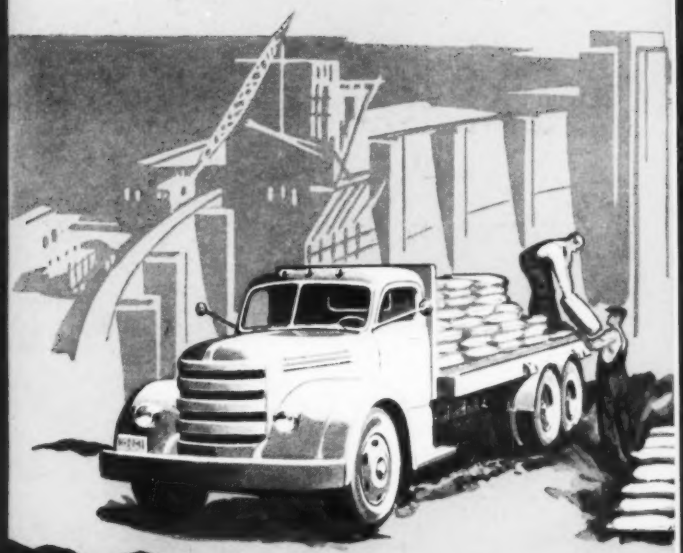
2-Speed Truck

AXLES Make Trucks Last Longer

Reduce Maintenance Costs



Because they double the number of gear ratios available on any truck, Eaton 2-Speed Axles permit the use of an efficient ratio for every operating condition. From "low low" for starting under full load to "high high" for empty return trips, the driver can select the ratio that puts the least stress on the engine and power transmitting units. As a result, maintenance costs are decreased and truck life is increased. Ask your truck dealer to show you how Eaton 2-Speed Axles more than pay for themselves on the 1½-ton and larger trucks for which they are available.

Axle Division

EATON MANUFACTURING COMPANY

CLEVELAND, OHIO

EATON

PRODUCTS: SODIUM COOLED, POPPET, AND FREE VALVES • TAPPETS • HYDRAULIC VALVE LIFTERS • VALVE SEAT INSERTS • JET ENGINE PARTS • ROTOR PUMPS • MOTOR TRUCK AXLES • PERMANENT MOLD GRAY IRON CASTINGS • HEATER-DEFROSTER UNITS • SNAP RINGS SPRINGTITES • SPRING WASHERS • COLD DRAWN STEEL • STAMPINGS • LEAF AND COIL SPRINGS • DYNAMATIC DRIVES, BRAKES, DYNAMOMETERS

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● The complete cylinder assembly is identical for *all* P&H Diesels — 1, 2, 3, 4 and 6 cylinder models. Replacements can be made in the field — from one engine to another — saving hours — even days on the job. Another good reason for standardizing on P&H Diesels. For literature, write Diesel Division, Harnischfeger Corporation, Port Washington, Wisconsin.

P&H DIESEL DIVISION
HARNISCHFEGER CORPORATION
PORT WASHINGTON WISCONSIN, U. S. A.

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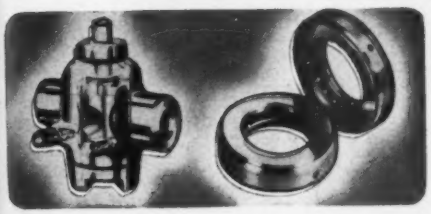
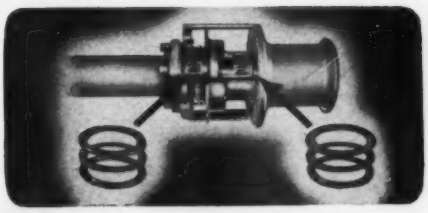
Helping Oilfield Equipment Do a Better Day's Work

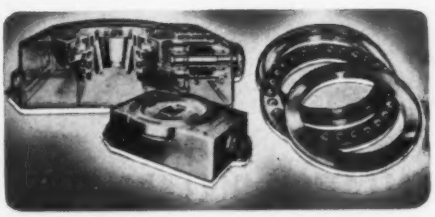
SIGNIFICANT FACT: In the last decade, as wells have gone deeper—and as equipment quality has gone deeper to meet this tougher task—Aetna oil field bearing applications have increased by more than 100%. **SIGNIFICANT REASON:** The conception and building of special bearings and parts for torture service is a basic part of Aetna's business—has been for over a third of a century. From Aetna know-how has come the solution to more than 2000 of American industry's "special" anti-friction problems. Why not tap this rich pool of experience next time YOU have an anti-friction problem? Aetna engineers are at your disposal. Write today!



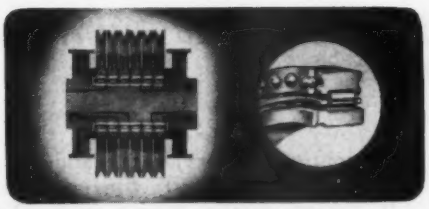
In **MISSION PLUG VALVES,** of 10,000 lb. capacity, Aetna self contained bearings make for easier assembly, assure reserve capacity and smoothness under every speed, shock and load condition encountered in plug valve operation.



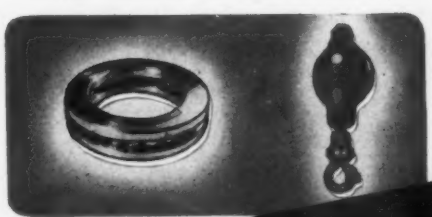
In **FOSTER CATHEADS,** two Aetna 3-piece bearings provide the high fatigue resistance, added load capacity and other operational advantages which make for longer, more efficient, more economical cathead performance.



In **IDECO ROTARIES,** the main bearing is an Aetna angular contact type—33" O.D., 3" balls, load capacity—200 tons . . . a product of Aetna's unsurpassed machining, hardening and grinding facilities for heavy duty sizes up to 38" O.D.



In **BEAUMONT BLOCKS,** (crown and traveling) Aetna's new, patented, combination cylindrical roller and ball thrust bearings divorce bearing loads into pure thrust and pure radial. Result: Width and weight of blocks are reduced, their strength and durability increased.



In **McKISSICK SAFETY BLOCKS,** Aetna one direction, flat seat, grooved raceway bearings are employed to take the shock, constant load and intermediate speeds encountered—to assure round-the-clock reliability and longer equipment life.

Aetna

AETNA BALL AND ROLLER BEARING COMPANY
4600 SCHUBERT AVE. • CHICAGO 39, ILLINOIS

Representatives and Distributors In Principal Cities

Standard and Special Ball Thrust Bearings • Angular Contact Ball Bearings • Special Roller Bearings • Ball Retainers • Hardened and Ground Washers • Sleeves • Bushings

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Husky Housings

SAVED INSTALLATION DOLLARS HERE!

— FURTHER ECONOMIES OFFERED TO YOU IN RUGGED "BUFFALO" INDUCED DRAFT FANS

• This "Buffalo" Induced Draft Fan installation at a prominent Natural Gas Company shows how easily stacks can be mounted on Buffalo fan outlets. The fan housings support the entire weight of the stacks in this economical outdoor installation.

This same rigid, heavy construction pays off in the long, punishing draft job, too. "Buffalo" Induced Draft Fans have extra-heavy housings and blades to stand the continual heat and erosion LONGER. Bearings and shafts are oversize—fully equal to continuous service demands. This means fewer timeouts (and timeouts cost money!). It means fewer repair bills. Yes, "Buffalo" Draft Fans are giving cheaper draft service everywhere because of this inbuilt extra endurance.

BUFFALO FORGE COMPANY

525 Broadway Buffalo, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

Branch Offices in All Principal Cities

Why Not Look

INTO these rugged fans that always save you money in the LONG RUN? Just Write for Bulletin 3190-B for all the engineering facts.

"Buffalo" FORCED AND INDUCED DRAFT FA

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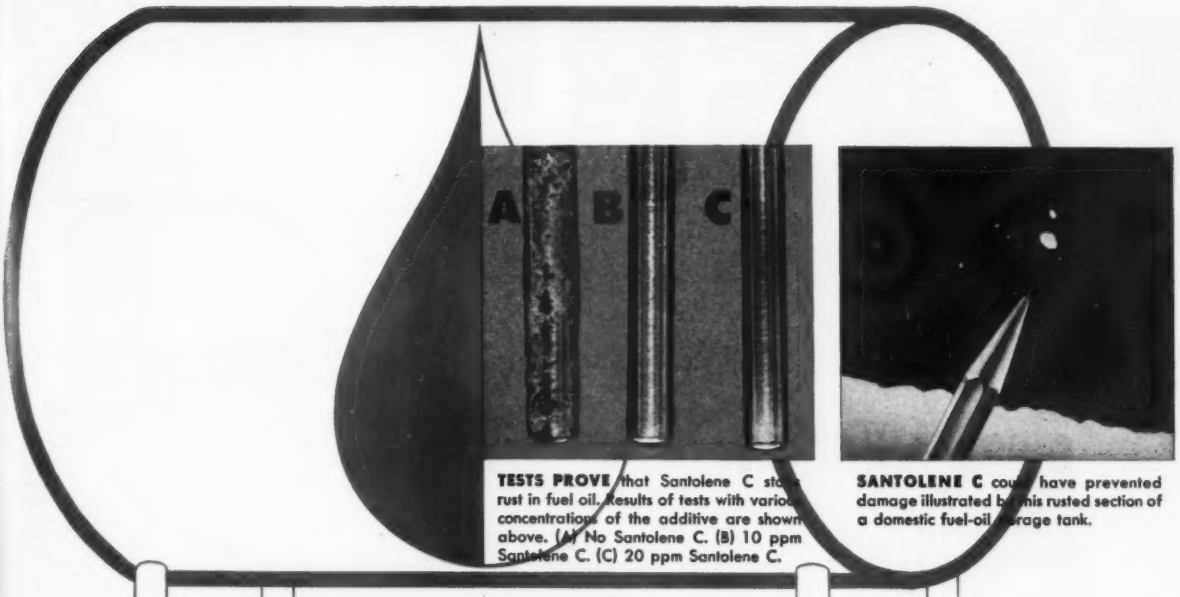


TESTS PROVE that Santolene C stops rust in fuel oil. Results of tests with various concentrations of the additive are shown above. (A) No Santolene C. (B) 10 ppm Santolene C. (C) 20 ppm Santolene C.

SANTOLENE C could have prevented damage illustrated by this rusted section of a domestic fuel-oil storage tank.

SANTOLENE C *STOPS RUST*

and gives your fuel oil a sales-making quality

Tell your fuel oil customers that your product prevents rust in their storage tanks and you'll get a larger share of the fuel oil business.

You can make that statement . . . and your oil can back it up with performance . . . if you add a minute quantity of Monsanto Santolene C to your product.

Santolene C stops rust . . . *economically*. The cost of inhibiting rust in a 42-gallon barrel of fuel oil usually is less than two-tenths ($0.002) of a cent.

Mail the coupon for details on how Santolene C can prevent rust in pipe lines and tanks . . . how it is effective in fuel oil, gasoline or any type of light petroleum product. MONSANTO CHEMICAL COMPANY, Organic Chemicals Division, 1745-F South Second Street, St. Louis 4, Missouri.

Santolene: Reg. U. S. Pat. Off.

MONSANTO
CHEMICALS AND PLASTICS

MONSANTO CHEMICAL COMPANY
Organic Chemicals Division
1745-F South Second Street, St. Louis 4, Missouri

Please send information on Santolene C, rust-inhibiting additive for light petroleum products.

Name..... *Title*.....

Company.....

Street.....

City..... *Zone*... *State*.....

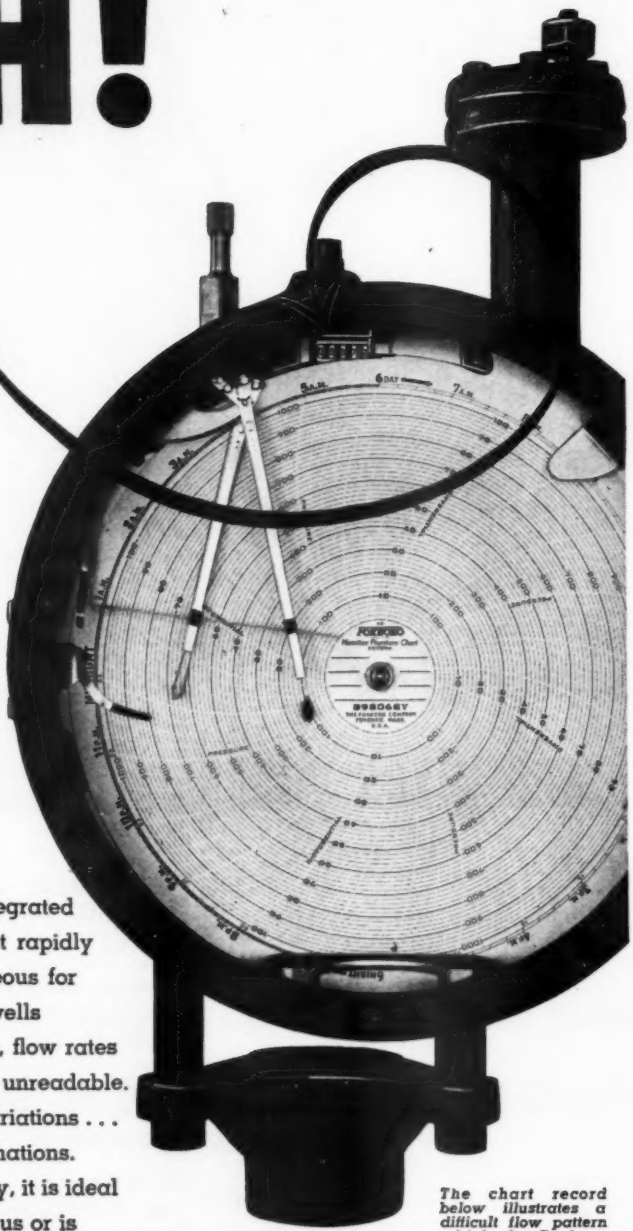
SERVING INDUSTRY . . . WHICH SERVES MANKIND

FLASH!

new pneumatic integrator gives ACCURATE totalization . . .

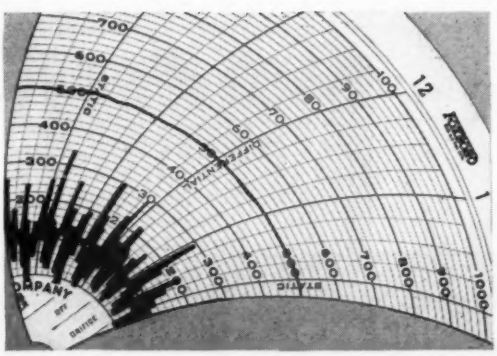
even on widely varying flow!

★ ***Integrates flow every 15 seconds***
★ ***Eliminates electrical hazard***



With the Foxboro Pneumatic Integrator, flow is integrated every 15 seconds — enabling it to follow the most rapidly changing flow rates. This is especially advantageous for measuring surging flow — such as gas going to wells equipped with intermitters. Under these conditions, flow rates change so rapidly and widely that charts are almost unreadable. Yet this fast-acting new integrator catches these variations . . . gives *accurate* totals instead of the usual approximations. In addition, since the instrument needs no electricity, it is ideal for installation where electricity would be hazardous or is unavailable . . . Write for complete Bulletin 394 describing this more-accurate Pneumatic Integrator. **The Foxboro Company, 60 Neponset Ave., Foxboro, Mass., U.S.A.**

The chart record below illustrates a difficult flow pattern which the Foxboro Pneumatic Integrator is successfully totalizing.



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INSTRUMENTS
RECORDING • CONTROLLING • INDICATING

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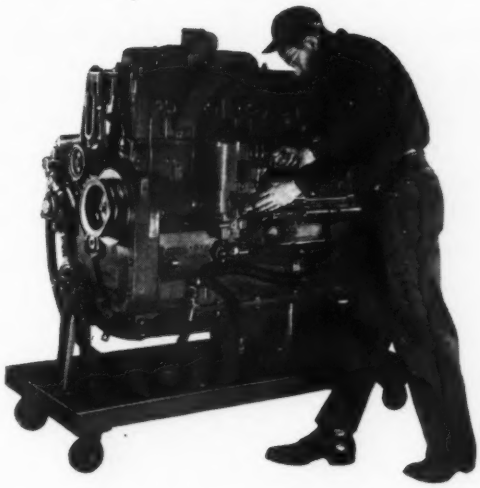
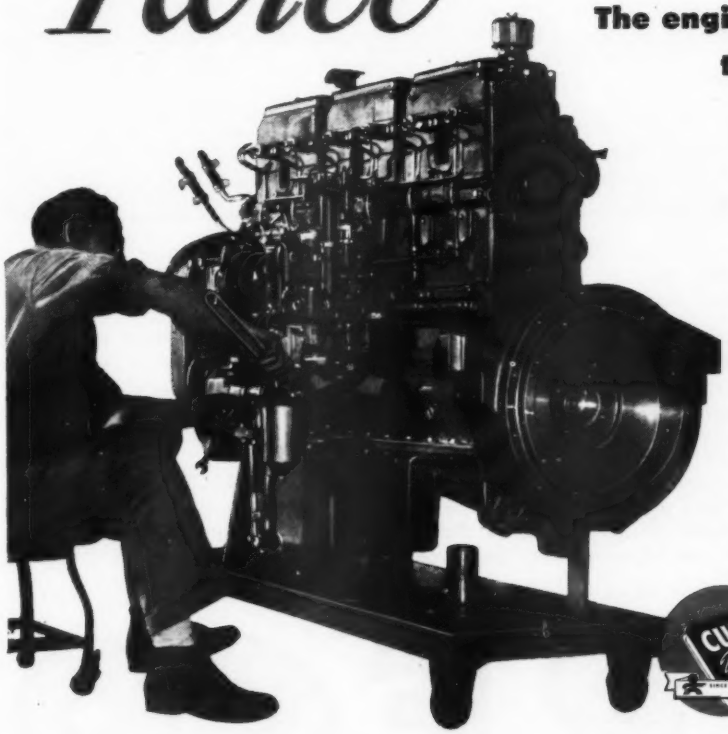
Cummins® Custom-built Diesels

Built not once but Twice





The engine that's built better to give power at lower cost

Why is a lightweight, high-speed Cummins Diesel the best buy in economical, dependable power? *Because every* part of *every* engine is made under strictest quality control methods. Each engine also is actually built *twice*. After initial assembly, each engine is run-in on the test block. Then it is torn down and carefully re-inspected—after that it is re-assembled and tested *again*.

Perfection in engine craftsmanship . . . Cummins exclusive fuel system . . . an unexcelled service and parts organization . . . mean that rugged, dependable Cummins Diesels make more profits for power users.

There's a model for your power needs. Contact your Cummins dealer. He has more facts to show you about making more profits with

Diesel power by CUMMINS

CUMMINS Dependable DIESEL

TRADEMARK REG. U.S. PAT. OFF.

CUMMINS ENGINE COMPANY, INC. · COLUMBUS, IND.

EXPORT: CUMMINS DIESEL EXPORT CORPORATION
Columbus, Indiana, U. S. A. · Cable: Cumdiex

Lightweight High-speed Diesel Engines (50-550 hp) for: On-highway trucks · off-highway trucks · buses · tractors · earth-movers · shovels · cranes · industrial locomotives · air compressors logging yarders and loaders · drilling rigs · centrifugal pumps generator sets and power units · work boats and pleasure craft.

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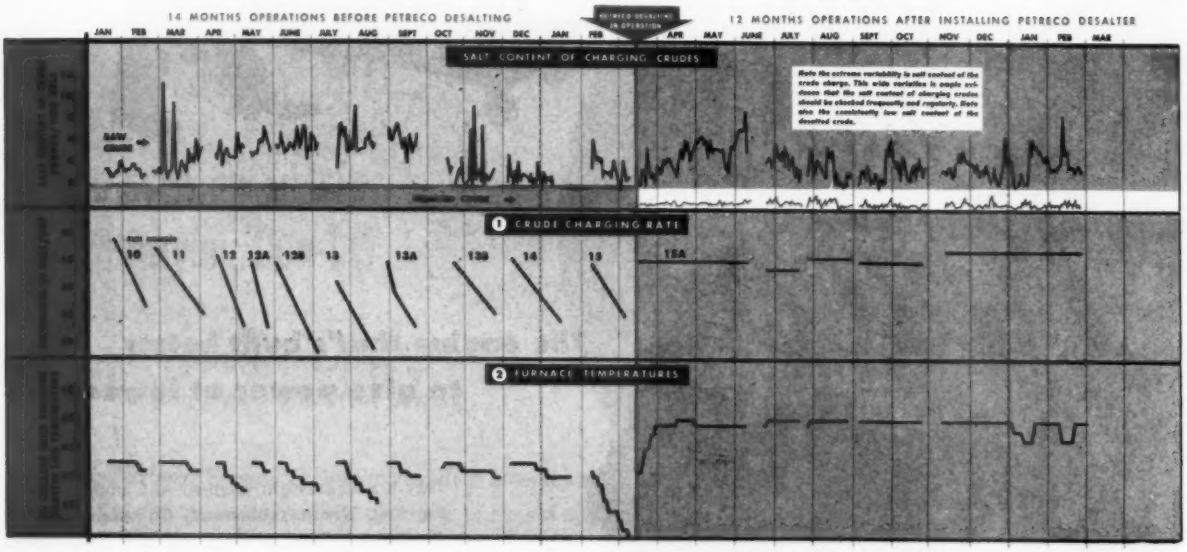
OVER TWO YEARS OF RECORDED REFINING OPERATIONS PROVIDE GRAPHIC PROOF OF BENEFITS FROM PETRECO DESALTING

For a 26 month period, 14 months *before* the Petreco Desalter was installed, and 12 months *after* the desalter was in operation, refinery personnel at a Texas refinery carefully observed and graphed the effects of salt on the operations of one unit. Particular attention was paid to the salt content of the charging crude and to the charging rates and furnace temperatures, both before and after installing the Petreco Desalter.


14 MONTHS OPERATIONS BEFORE PETRECO DESALTING
PETRECO DESALTING IN OPERATION
12 MONTHS OPERATIONS AFTER INSTALLING PETRECO DESALTER
JAN FEB MAR APR MAY JUNE JULY AUG SEPT OCT NOV DEC JAN FEB APR MAY JUNE JULY AUG SEPT OCT NOV DEC JAN FEB MAR
SALT CONTENT OF CHARGING CRUDES
RAW CRUDE
1 CRUDE CHARGING RATE
10 11 12 12A 12B 13 13A 13B 14 15 15A
2 FURNACE TEMPERATURES

The top graph shows the wide variation in salt content before desalting with Petreco, and to what low values Petreco reduced the salt in the crude charge.

Graph No. 1 shows how the comparatively high salt content of the crude caused the daily charging rate to decline. The effect of Petreco Desalting is obvious in the right hand section.

Graph No. 2 illustrates how Petreco Desalting permitted the use of higher *sustained* furnace temperatures. Before desalting, even the lower temperatures employed dropped off rapidly.

Petreco desalting does not necessarily benefit every refiner in exactly the same way, since refineries differ widely in charging procedures, flow schemes, and so on. However, regardless of the physical characteristics of the crude charged, the flow scheme of the refinery, or the type of refining procedures used, with every installation, Petreco Desalting has shown a rapid pay-out in improved operations, increased capacities and substantial maintenance economies.

Profit by the experience of the many refiners who rely on Petreco for the more economical operations assured by efficient salt removal. For further information, write or call

PETROLEUM RECTIFYING COMPANY

5121 SO. WAYSIDE DRIVE, HOUSTON 1, TEXAS

1390 E. BURNETT ST., LONG BEACH, CALIFORNIA

ONLY PETRECO OFFERS COMPLETE DESALTING SERVICE PERSONNEL AND FACILITIES

PETRECO

SPECIALIZED *Electric* PETROLEUM PROCESSES { DESALTING / DEHYDRATING

PR 50-6

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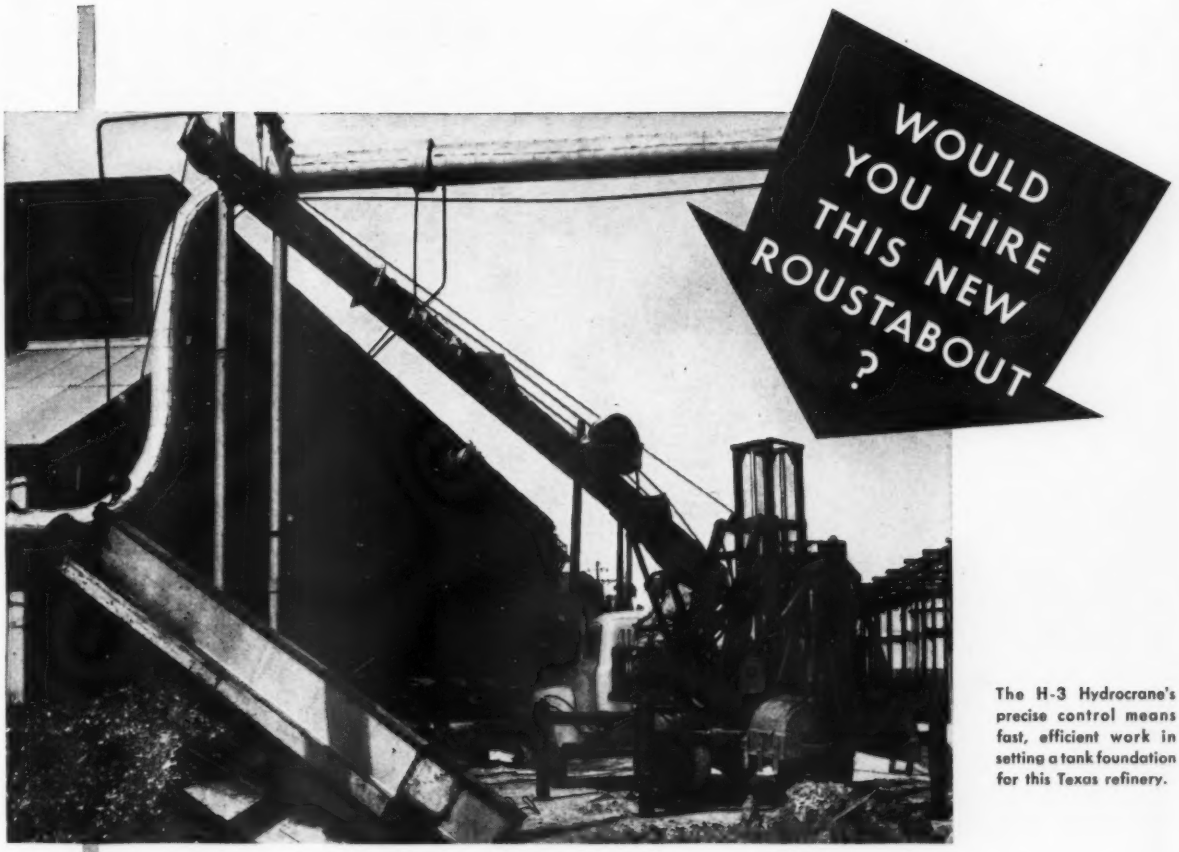

The H-3 Hydrocrane's precise control means fast, efficient work in setting a tank foundation for this Texas refinery.

WHAT do you think about the truck-mounted Hydrocrane for your part of the oil industry? We *know* it's a big time and money saver for many users — builders, sewer and water contractors, steel erectors, factories, loggers, public utilities and many others.

We think it can fill an equally definite need in the oil industry for the countless "in-between" jobs too big for hand labor, too small for big machines. It can speed up digging, lifting and material handling jobs at refineries, producing plants, drill sites, pipe lines and supply houses.

Every crane function is fully hydraulic. Control is so precise you can move a load a fraction of an inch at a time if necessary. Telescoping boom is great for close quarters — can nose in and out of windows without moving the crane an inch.

Operation is simple — hand levers only — no foot controls. New operators have run this crane after only two hours practice.

These are the facts in brief — you be the judge. If you think this rig has possibilities on your jobs, send the coupon and we'll give you more details.

The Hydrocrane is built in two sizes — ¼ yd. 2-ton and ⅜ yd. 3-ton — 38 ft. maximum boom length.

BUCYRUS ERIE HYDROCRANE

South Milwaukee, Wisconsin

BUCYRUS-ERIE HYDROCRANE DIVISION
South Milwaukee, Wisconsin

Gentlemen: Send me full details on the Hydrocrane.

Check one:
- ☐ Refinery
- ☐ Supply House
- ☐ Driller
- ☐ Producer
- ☐ Pipe Line

Name.....
Company.....
Address.....
City..... State.....

87H50

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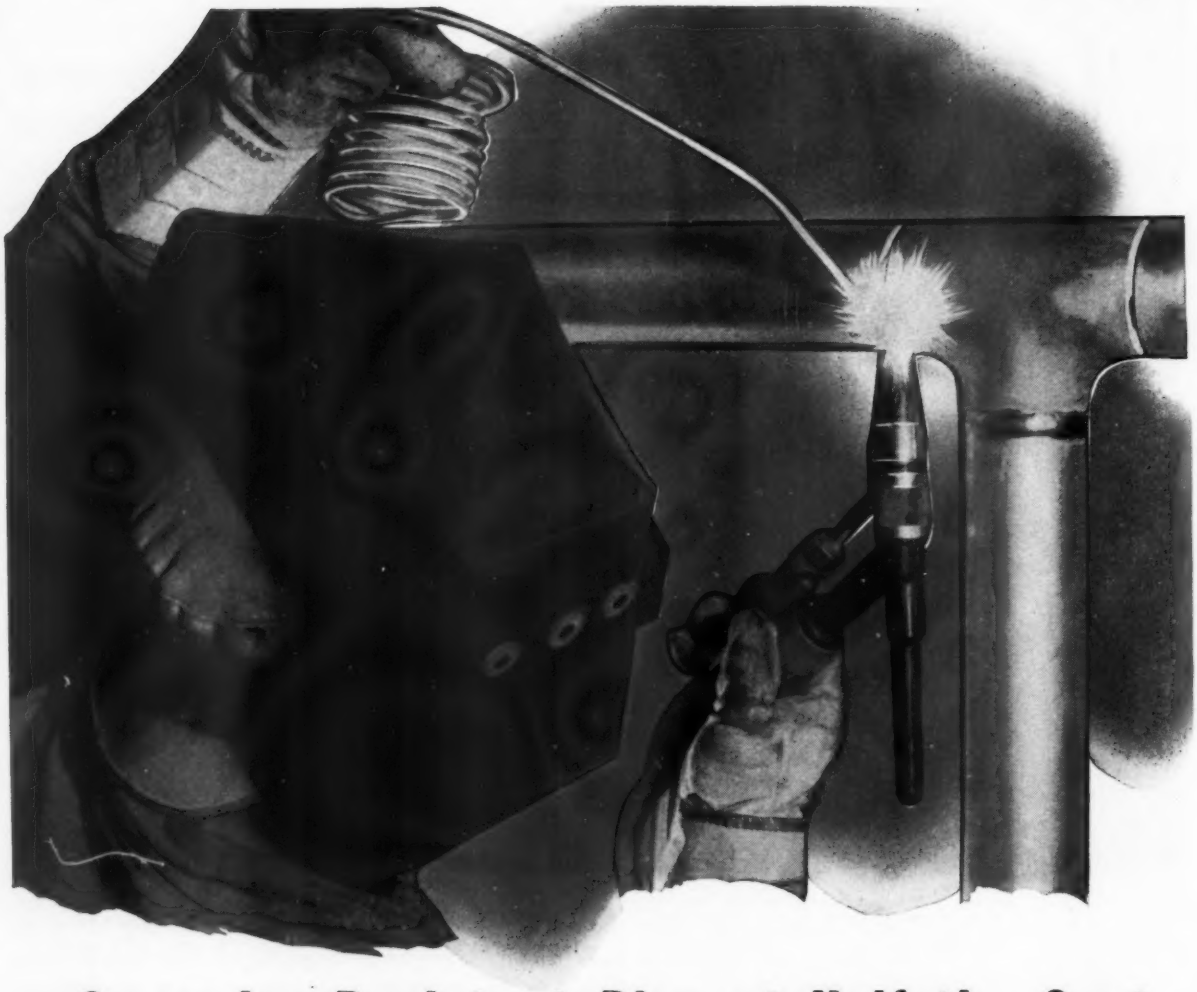


Corrosion-Resistant Pipe at Half the Cost

ALCOA ALUMINUM PIPE COSTS LESS, INSTALLS FASTER

Want to save up to 50% on corrosion-resistant pipe? Specify Alcoa Aluminum Pipe—lowest-cost corrosion-resistant pipe you can buy. Highly resistant to attack by sulfur compounds—safely carries many chemicals, petroleum products, foods, commodities. Protects product purity—is often used where maintenance of color is essential. Weighs only one third as much as ordinary metal pipe. Easy to install using familiar methods and with standard fittings and flanges available from nationally-known manufacturers.

Alcoa Aluminum 63S Pipe is seamless, and comes in ⅛ inch to 12-inch standard pipe sizes. For your nearest supplier who will give you helpful information on welding, threading, etc., call your local Alcoa sales office, or write ALUMINUM COMPANY OF AMERICA, 1978H Gulf Bldg., Pittsburgh 19, Pa.

For local source of supply on Alcoa Aluminum Pipe and other Alcoa products, look under "Aluminum" in your classified telephone directory.

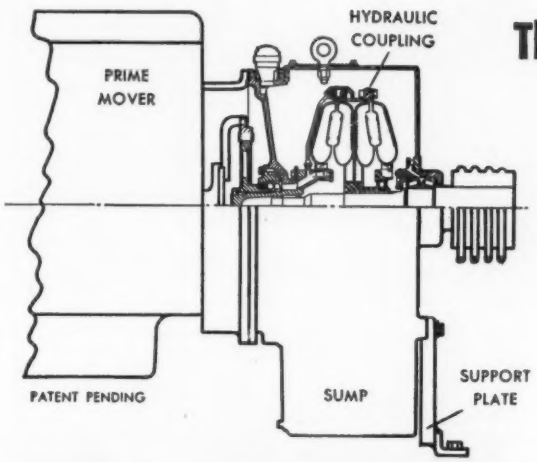
FREE BOOKLET gives you the whole story on Alcoa Aluminum Pipe. Write for your copy today.

ALCOA ALUMINUM PIPE

ALCOA ALUMINUM

INGOT • SHEET & PLATE • SHAPES, ROLLED & EXTRUDED • WIRE • ROD • BAR • TUBING • PIPE • SAND, DIE & PERMANENT-MOLD CASTINGS • FORGINGS • IMPACT EXTRUSIONS
ELECTRICAL CONDUCTORS • SCREW MACHINE PRODUCTS • FABRICATED PRODUCTS • FASTENERS • FOIL • ALUMINUM PIGMENTS • MAGNESIUM PRODUCTS

Another great advancement in hydraulic drives for drilling equipment...



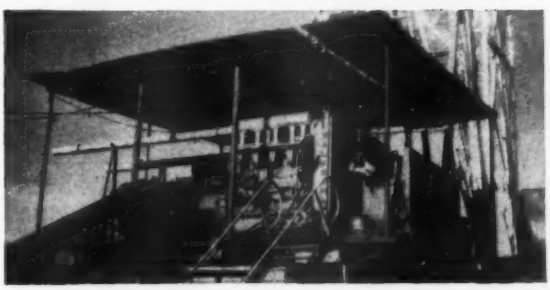
The *NEW* Twin Disconnecting Coupling

In the new Twin Disc Model HUD hydraulic unit, the "D" stands for *disconnecting*.

No master clutch is required with this hydraulic drive. For when a complete disconnect is desired, fluid is "dumped" from the coupling and held in a reservoir. This fluid is quickly pumped back into the coupling when you are again ready to pick up the load.

This hydraulic coupling serves as its own master clutch . . . has all the advantages of a hydraulic drive without sacrificing space. The Model HUD is a *compact* power unit in which shocks are dampened, the load picks up smoothly, and jerks and jolts in hoisting are eliminated.

And these advantages add up to cash savings . . . less maintenance, fewer replacements, more work done on every tower. You'll reduce costs when your rig is equipped with the *new* Twin Disc Model HUD Hydraulic Drive—the Twin *Disconnecting* Coupling.



O'Neal Drilling Company's Emsco GA-500 rig on location in Scurry County, Texas. *For complete information on how HUD disconnecting couplings speeded up production on this rig, write to Twin Disc.*

TWIN DISC
CLUTCHES AND HYDRAULIC DRIVES

Clutches & Hydraulic Drives

TWIN DISC CLUTCH COMPANY, Racine, Wisconsin • HYDRAULIC DIVISION, Rockford, Illinois

BRANCHES: CLEVELAND • DALLAS • DETROIT • LOS ANGELES • NEWARK • NEW ORLEANS • SEATTLE • TULSA

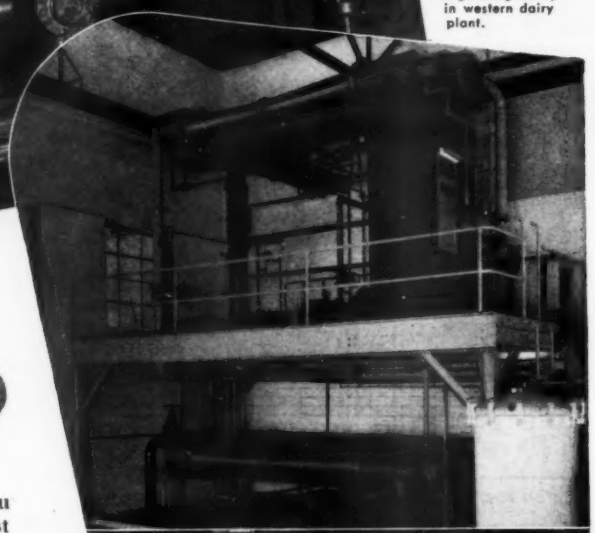
XUM

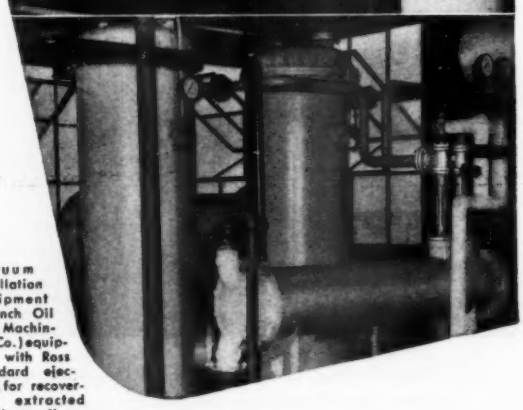
Special or normal . . .

YOUR CONDITIONS ARE STANDARD HERE

Test Rack, equipped with Ross standard ejectors, for a wide range of operating conditions.

Two Ross Decalorators (vacuum refrigerating units) in western dairy plant.





Vacuum distillation equipment (French Oil Mill Machinery Co.) equipped with Ross standard ejectors, for recovering extracted soy bean oil.

ROSS

STEAM JET EJECTORS

Your conditions may be classed "special", or you may consider them "normal". But to Ross, most conditions are *standard*, are quickly met by long, diversified engineering experience . . . highly developed plant skills.

For during the many years that Ross has been designing and fabricating steam jet ejectors . . . starting with their use on surface condensers and following with the more general, industrial applications on vacuum refrigeration, vacuum distillation and oil deodorizing equipment, Ross engineers have gained the position *and the reputation* of dealing with *any* problem quickly, practicably, economically.

As a result of such experience, Ross has been able to standardize ejectors . . . to establish a series of standard frame sizes. Therefore, by simply selecting the most suitable size steam nozzle and other parts, normal requirements can be quickly accommodated. And by the same token, so-called "special" conditions are quickly met, too . . . some through modification of standard units . . . others through individualized engineering and fabrication.

GAIN TIME — Wide experience enables Ross engineers to be of genuine assistance to you . . . whether your conditions call for single or multi-stage units, with or without surface or barometric inter and after condensers. Feel free to consult.

ROSS HEATER & MFG. CO., INC. Division of American Radiator & Standard Sanitary Corporation **1417 West Ave., Buffalo 13, N. Y.**

In Canada, Horton Steel Works, Limited, Fort Erie, Ont.

Serving home and industry

AMERICAN STANDARD • AMERICAN BLOWER • CHURCH SEATS • DETROIT LUBRICATOR • KEWANEE BOILERS • ROSS HEATER • TONAWANDA IRON

Exact
INCLUDED ANGLE
Assures a perfect fit with

MIDWEST
WELDING ELBOWS

There's a reason why work zips along faster, why welders do better work when you specify Midwest Welding Elbows: Exact Included Angle.

This dimensional accuracy is possible because of Midwest's extra manufacturing step of final sizing in compression and simultaneous machine beveling in special machines built by Midwest.

All Midwest Welding Fittings are available through your Jones & Laughlin Supply store. Whether you buy one or a carload your nearby store will be glad to serve you.

MIDWEST
WELDING FITTINGS IMPROVE DESIGN AND REDUCE PIPING COSTS

"... here's MY warehouse!"

Jones & Laughlin Supply Company

Subsidiary of Jones & Laughlin Steel Corporation

J&L STEEL

TULSA, OKLAHOMA

EXPORT: 405 LEXINGTON AVE., NEW YORK, N.Y. U.S.A.

XUM

THEY'RE *New -- Better, Cheaper and More Efficient*

BROWN FINTUBE *Thermo-Flo* TANK HEATERS

● Brown Fintube THERMO-FLO Tank Heaters are service proved — and offer many advantages as compared to the old method of using a bare pipe coil on the bottom of the tank.

EASY INSTALLATION—THERMO-FLO heaters are compact units. They will pass through a standard 20 inch manway with ample clearance.

REDUCED FOULING—The vertical mounting practically eliminates depositing on the tubes, and avoids the necessity of heating through a layer of sediment.

EFFICIENT HEAT TRANSFER — THERMO-FLO heaters set up a thermal siphon or "flow" within the tank, resulting in highly efficient heat transfer — and avoiding stratification.

LOW VOLUME DISPLACEMENT—Due to Brown's exclusive finned tube construction, each lineal foot of fintube in the THERMO-FLO heater has the surface equivalent of 6 lineal feet of plain bare pipe.

STURDY CONSTRUCTION — THERMO-FLO heaters are built to a standard design — in low cost production quantities — and are completely assembled and tested before shipment.

INEXPENSIVE—Users report that the cost of a group of Brown Fintube THERMO-FLO heaters — plus their installation — is *less* than just the installation of a bare pipe coil having equivalent heating capacity.

EASY MAINTENANCE—THERMO-FLO heaters can be removed from the tank easily and repaired or cleaned *outside* the tank,— or a damaged heater can be replaced with another standard heater from stock.

HIGHLY FLEXIBLE—THERMO-FLO heaters can be installed in new or existing tankage and additional units can be added to meet changing conditions.

MEET ANY REQUIREMENT—THERMO-FLO heaters can be installed singly or in groups. Fabricated from mild steel, stainless steel, monel, everdur, admiralty or other metals, to meet individual conditions.

Bulletin No. 491 Gives Full Details.
Write for a copy. Today!

THE BROWN FINTUBE CO.
ELYRIA, OHIO

FINTUBE
HEAT TRANSFER
PRODUCTS

XUM

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XUM

Exclusively, W-K-M

No other valve provides these exclusive W-K-M Valve features . . . whether for low or high pressures: a round, full bore conduit opening entirely through the valve in open position . . . parallel expanding gates which expand outwardly to seal on both sides instead of wedging or jamming . . . over size bronze renewable seats . . . automatic lubrication from lubricant contained in body and bonnet.

Exclusively W-K-M, too, is a large and competent field organization qualified to consult with, and to render field emergency service and otherwise assist our customers in obtaining satisfactory service and longer [illegible] their W-K-M Through Conduit Lubricated Gate

W-K-M Company

OIL FIELD, PIPE LINE & INDUSTRIAL EQUIPMENT

HOUSTON, TEXAS, U. S. A.
LOS ANGELES

Cable Address: "WILKOMAC"
Export Office: 30 Rockefeller Plaza, New York, N. Y.

XUM

GREAT NEW ADVANTAGES IN TRUCK MIXERS

achieved with Chrysler Industrial Engines and Chrysler gýrol Fluid Drive

Reverse rotation of the drum without throwing damaging shocks and impacts into the transmission, engine and other parts of the machine!

No shear pins to replace! Smoother operation! Lower maintenance costs! Longer life! These are only a few of the advantages Chrysler Industrial Engines with gýrol Fluid Drive have brought to operation of truck mixers.

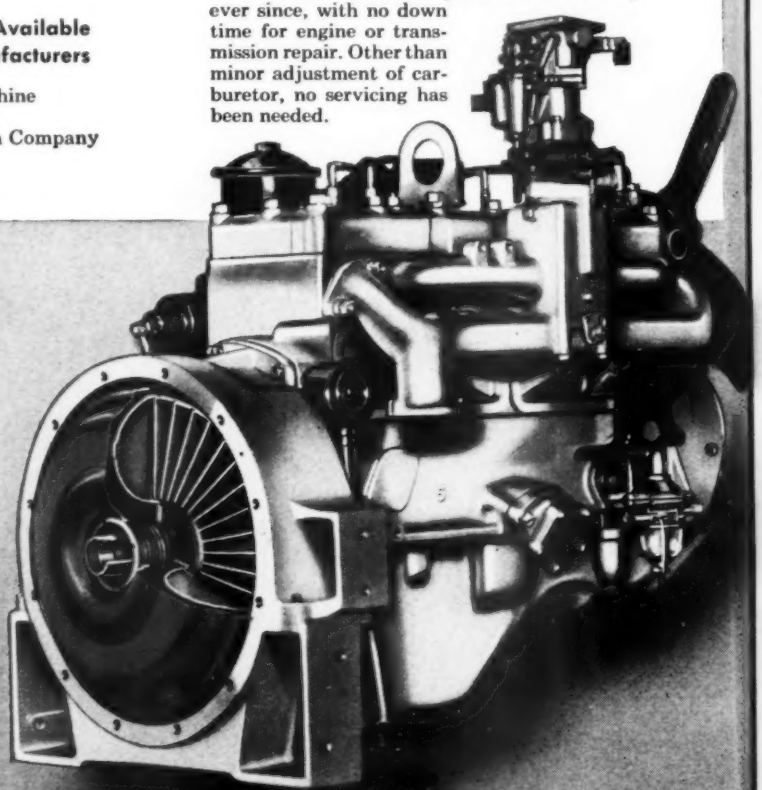
In addition, Chrysler Fluid Coupling prevents engine stalling, reduces clutch wear, eliminates jolts and gear rattle, simplifies starting from standstill with excessive load, gives gradual oil-smooth acceleration—opens a whole new field of improved operation for gasoline-powered equipment. See your Chrysler Industrial Engine Dealer or write us. ***Industrial Engine Division, Chrysler Corporation, Detroit 31, Michigan.***

Chrysler gýrol Fluid Drive Now Available For Truck Mixers From These Manufacturers

Blaw-Knox Division of Blaw-Knox Company
Chain Belt Company
Jaeger Machine Company
T. L. Smith Company

A Typical Experience

Five years ago, a Rex Moto-Mixer equipped with Chrysler Industrial Engine and gýrol Fluid Drive was placed in operation by the Tews Lime and Cement Company of Milwaukee. The unit has been operated continuously ever since, with no down time for engine or transmission repair. Other than minor adjustment of carburetor, no servicing has been needed.

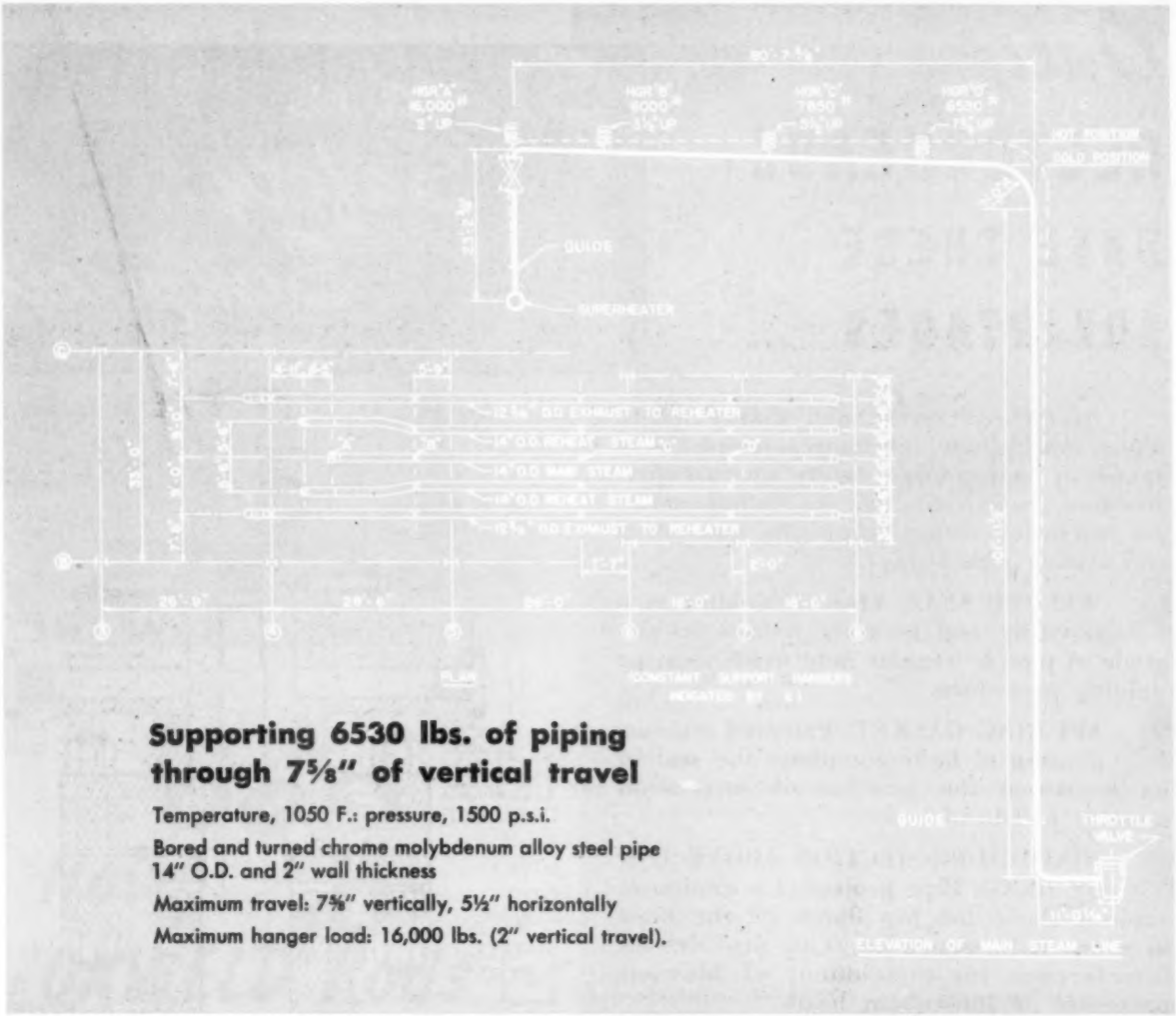


Chrysler gýrol Fluid Drive is built integral with Chrysler Industrial Engines. Its cost is only a few dollars more than the conventional flywheel which it replaces.

CHRYSLER

Industrial Engines and Power Units

HORSEPOWER WITH A PEDIGREE



Supporting 6530 lbs. of piping through 7⅝" of vertical travel

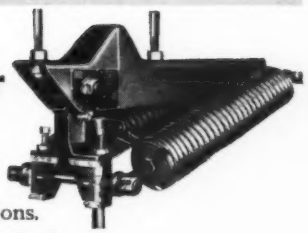
Temperature, 1050 F.: pressure, 1500 p.s.i.

Bored and turned chrome molybdenum alloy steel pipe 14" O.D. and 2" wall thickness

Maximum travel: 7⅝" vertically, 5½" horizontally

Maximum hanger load: 16,000 lbs. (2" vertical travel).

ONLY a Grinnell Constant-Support Hanger solves this problem easily, practically



Provides constant support to piping subject to vertical movement — in all hot and cold positions. Maintains full safety factor in supporting high temperature, high pressure piping. Non-resonant and energy absorbing. Mass-produced from standard precision parts. Individually calibrated for each installation. Load-adjustment features incorporated into design. Models to meet entire range of load-travel specifications. Minimum headroom required.

Believing that a good piping job is too important to be jeopardized by improvised or inadequate pipe hangers, Grinnell has developed a complete line of stock hangers and supports for every piping need from a simple water pipe to a high pressure, high temperature steam line. Write for Catalog 10-D.

GRINNELL

Grinnell Company, Inc., Providence, R. I. Branches: Atlanta • Billings • Buffalo • Charlotte • Chicago • Cleveland • Cranston • Fresno • Kansas City • Houston • Long Beach Los Angeles • Milwaukee • Minneapolis • New York • Oakland • Philadelphia • Pocatello • Sacramento • St. Louis • St. Paul • San Francisco • Seattle • Spokane

XUM

Only RECTORHEADS HAVE THESE ADVANTAGES . . .

Speed . . . Safety . . . Simplicity

Rectorhead casing and tubing heads, alone, have these advantages which mean speed in making-up, safety against fire, freedom from leaks, and no "blind spots" for corrosive action, simplicity in setting and sealing pipe strings.

1. **WELDED SEAL.** Floating welding ring is easily and securely welded to any grade of pipe by regular field welders, using welding procedure.

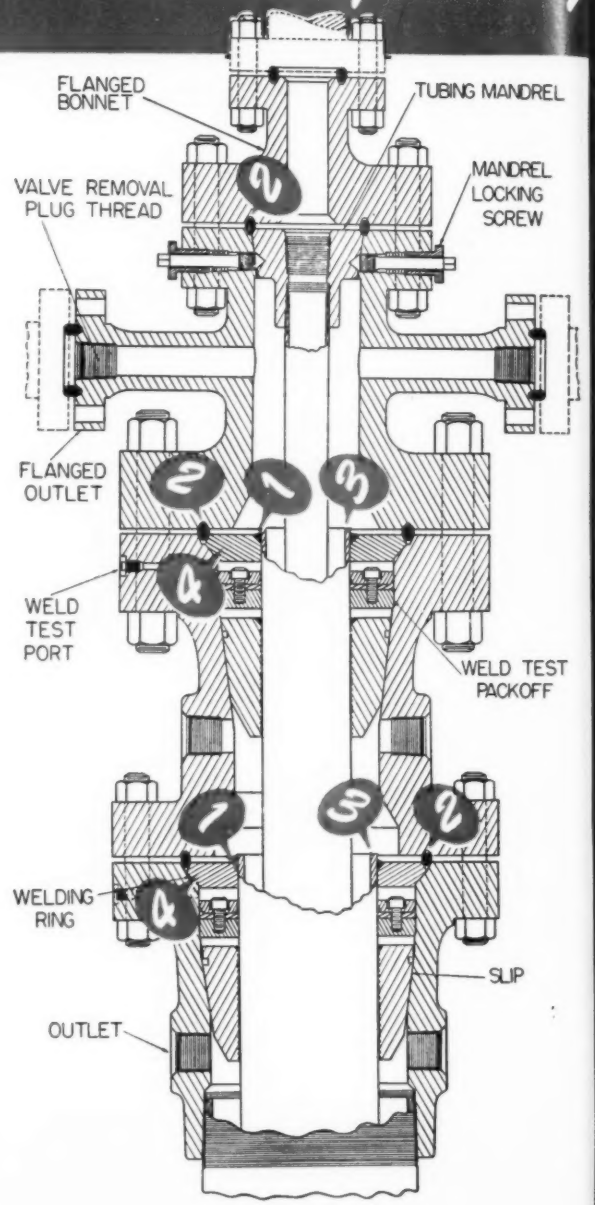
2. **API RING GASKET.** Patented seal-suspension to body completes the seal in its groove at the junction of suspension member and head body.

3. **MINIMUM PROJECTION ABOVE TOP OF HEAD.** Pipe protrudes a minimum amount above the top flange of the head in which it is suspended. This provides no interference for attachment of blowout preventer or subsequent heads.

4. **SEALING ELEMENT INDEPENDENT OF SLIPS.** Neither the welding ring nor weld are subjected to opposing forces (flange bolts pulling against heat expansion) during or after the weld.

PLUS: **In addition, Rectorhead seals are immune to corrosion inhibitors . . . fireproof . . . free of the danger of leaks due to freezing . . . require no packing replacement . . . have no complicated packing arrangements to install.**

Call your nearest Rector Representative, or write for catalog.



RECTOR WELL EQUIPMENT CO., INC.

FORT WORTH, TEXAS

Fort Worth Plant . . . . . 1100 N. Commerce St.
Houston Plant . . . . . 2215 Commerce St.

Representatives in All Active Fields

RECTORHEAD

MAKING THE OIL INDUSTRY SAFER!

ASSOCIATION WELL HEAD EQUIPMENT MANUFACTURERS CERTIFIED

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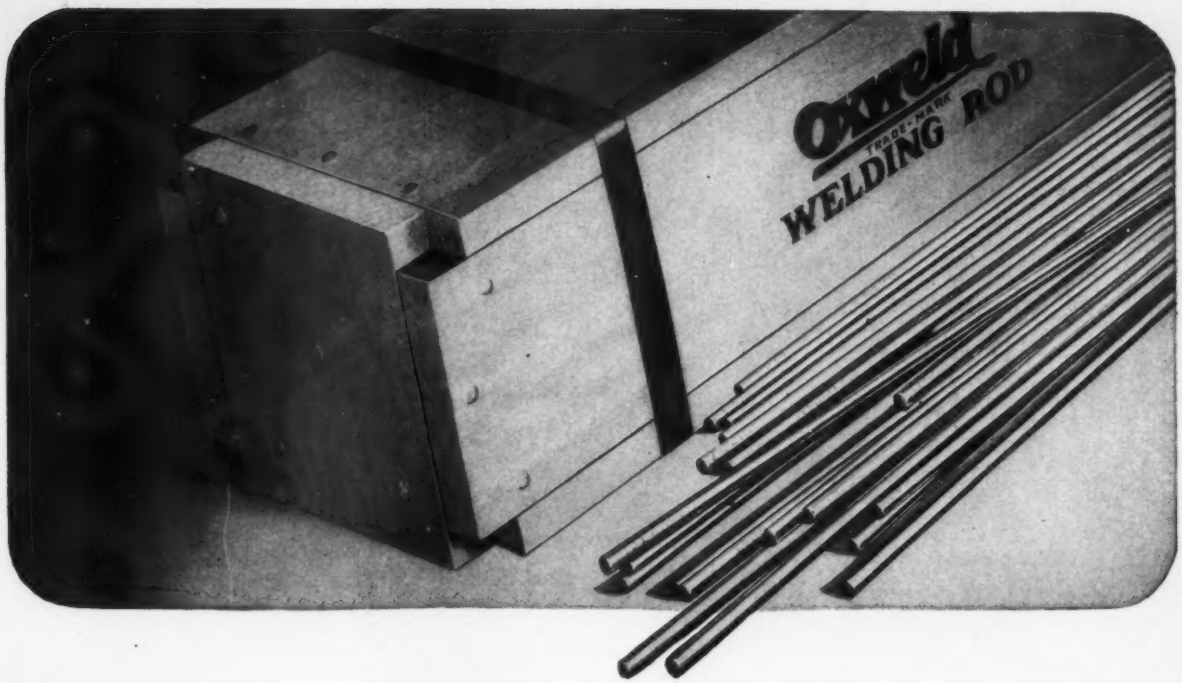

How "OXWELD" Rods Reduce Welding Costs

Trade-Mark

☑ **You use less rod per weld,** because OXWELD Rods produce high-strength welds with minimum reinforcement. OXWELD No. 1 H. T. Rod, for example, has a tensile strength 11,000 lb. per sq. in. higher than any ordinary steel rod—enough *extra strength* to permit reduction of the amount of weld metal on a job, with substantial saving of gases and labor.

☑ **You weld easier and faster**—saving both time and gases—because all formulas for OXWELD Rods are worked out to give highest weldability as well as best possible physical properties in finished welds.

☑ **You get better welds at lower finishing costs,** because welds made with OXWELD Rods are always of uniform high quality, strength, and ductility—easy to machine and finish without excessive labor.

☑ **You need fewer types of rods** to handle your complete range of welding. Five OXWELD Rods—No. 1 H. T. Steel, No. 7 Drawn Iron, No. 25M Bronze, No. 23 Aluminum, and No. 9 Cast Iron—are sufficient for all average fusion welding, braze-welding, and bronze-surfacing. For the less frequent jobs of specialized nature, there are 9 additional welding rods and 8 hard-facing rods—all available from the same source.

The term "Oxweld" is a registered trade-mark of Union Carbide and Carbon Corporation.

Look for the
Oxweld
Trade-Mark
on the rod or
on the box

THE LINDE AIR PRODUCTS COMPANY

Unit of Union Carbide and Carbon Corporation

30 East 42nd Street UCC New York 17, N.Y.

Offices in Other Principal Cities

In Canada: DOMINION OXYGEN COMPANY, LIMITED, Toronto

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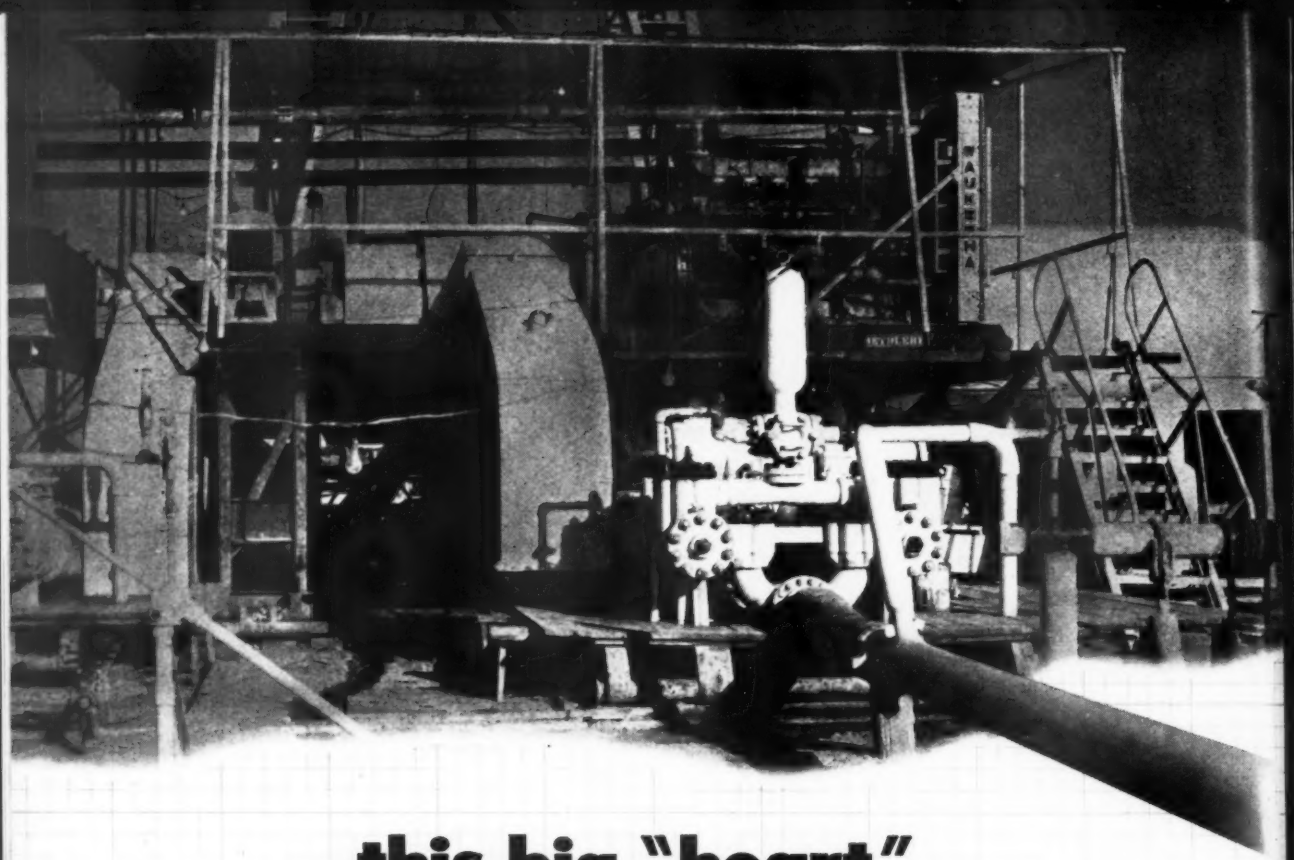


this big "heart" beats 316,800 times a day

Heart of many a drilling mud circulating system used in oil fields today is a Bethlehem Supply Company G-600 Power Slush Pump. To help keep them pumping steadily, 316,800 strokes a day, Torrington Spherical Roller Bearings are used on power input shafts.

In this position, Spherical Roller Bearings handle overhung loads without uneven stress concentrations. They eliminate sliding and rubbing friction, deliver power efficiently at all speeds and provide low starting torque.

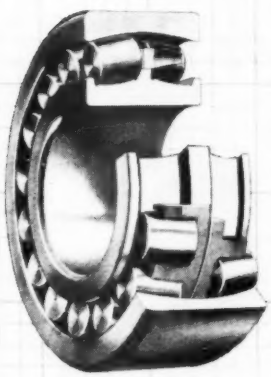
In applications where deflection or misalignment are operating or installation factors, consider Torrington Self-Aligning Spherical Roller Bearings for long service life. Let our engineers help you apply them to your equipment.

THE TORRINGTON COMPANY

South Bend 21, Ind. Torrington, Conn.

District Offices and Distributors in Principal Cities of United States and Canada

ON TORRINGTON SPHERICAL ROLLER BEARINGS



TORRINGTON *SPHERICAL ROLLER* **BEARINGS**

SPHERICAL ROLLER • TAPERED ROLLER • STRAIGHT ROLLER • NEEDLE • BALL • NEEDLE ROLLERS

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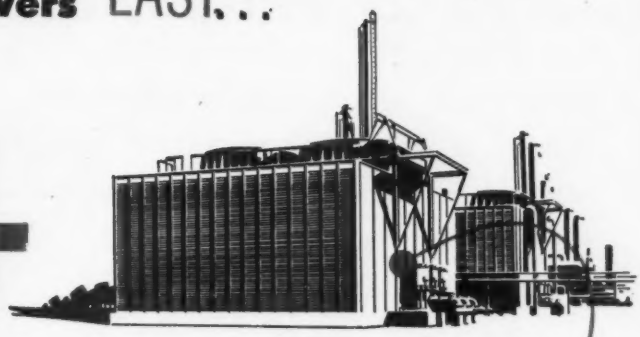
make your cooling towers LAST...
with

penta-
chlorophenol



the CLEAN **wood preservative**

YOU CAN REALIZE GREATER DURABILITY IN COOLING TOWERS BY treating lumber with PENTA—the clean wood preservative. PENTA gives wood longer life and permanence. PENTA-PROTECTED wood resists termites and decay under severest moisture conditions—lasts up to *four times longer* than untreated wood.

PENTA-PROTECTED wood is economical, too. Longer, safer wood life means less maintenance, less time expended on repairs and breakdowns. Because it's clean, PENTA leaves wood easy to handle and work with.

Be sure! Specify PENTA-PROTECTED wood for your cooling towers—in fact, for all wood structures where durability and efficiency are necessary. For further information about PENTA, write to Dow, Dept. PE 60.

THE DOW CHEMICAL COMPANY • MIDLAND, MICHIGAN

DOW
penta-
chlorophenol

XUM

Powerful Tractor Truck-Trailer Combination hauls 20-25 ton payloads to any location!

Great power and traction to pull through sand, soft ground, slippery surfaces without bogging down—fast and safe on the highway—meets legal weight and width highway limitations.

Maybe you've given up on heavy trailer hauling because you couldn't find a tractor unit to handle the job. Now you can have all the benefits of high-tonnage oil-field trailer hauling . . . bigger rigs, heavier loads, greater maneuverability, lower hauling cost . . . by hauling properly designed trailers with Walter Tractor Trucks.

High-powered, rugged Walter Tractor Trucks are designed especially for this type of hauling. They have tremendous power; unfailing four-wheel traction of the exclusive Four Point Positive Drive; proper gear ratios for fast highway hauling and powerful pulling off the highway; suspended double reduction drive; tractor type transmission; high ground clearance; and many other specially engineered features.

This Walter Tractor Truck-Trailer method is your opportunity to gear your oil-field hauling to the fast moving pace of your other operations. Our engineers invite your inquiries.

WALTER MOTOR TRUCK CO.

1001-19 Irving Ave., Ridgewood 27, Queens, L. I., N. Y.

These figures tell the story!

Gross Train Weight: 70,000-80,000 lbs.

Net Payload: 40,000-50,000 lbs.

Axle Loading: 18,000-20,000 lbs.

Engines: 200 to 260 hp, gasoline or diesel

Piston Displacement: 700 to 1200 cu. in.

Tires: Single, low pressure 16:00-24

Trailer: Semi or pole type, with four single low pressure tires, 16:00-24

WALTER

4-POINT POSITIVE DRIVE

TRACTOR TRUCKS

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Want to SAVE on Instrument Maintenance? then stock versatile, dependable...

NEW! ROCKWELL CHART DRIVES

They Fit Practically All Orifice Meters and Recording Instruments

YOU SAVE (3) WAYS

1 ON INVENTORY The company that now maintains a stock of assorted chart drives of various makes and speeds will find it economical and desirable to standardize on the Rockwell. A much smaller inventory of drives need be carried—the difference being made up by the proper selection of inexpensive adaptors and turrets. The adaptors correctly position the drive in the instrument case and the turrets furnish up to 11 different rotation speeds from the same drive.

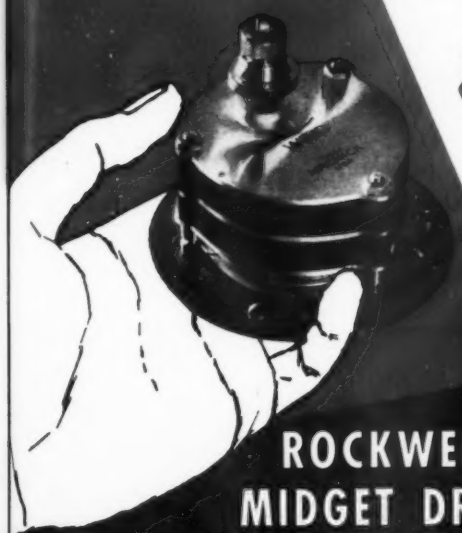
2 IN SERVICE Rockwell chart drives are exceptionally well made for long trouble-free service. They are sealed against moisture, dirt and corrosive gases; have a single winding stem. By using a heavier mainspring and a stronger winding stem, the principal causes of failure are minimized.

3 ON REDUCED MAINTENANCE Your service men need be educated on the maintenance of only one make of drive instead of many. When required, servicing the Rockwell is easy—both the winding stem with gear and the mainspring barrel unit can be replaced in a few minutes time using ordinary tools. We offer an exceptionally attractive factory repair and exchange service on completely rebuilt, fully guaranteed drives at very low cost—24 hour service if necessary.

ROCKWELL STANDARD DRIVE

Illustrating how turrets lock on to the chart arbor to change rotation speeds.

For 8-day drives, (basic rotation speed 24 hr.) Turrets will convert to 2-hour, 3-hour, 4-hour, 6-hour, 8-hour, 12-hour, 48-hour, 3-day, 7-day and 8-day rotation. The 31 day drive (basic rotation speed 7 day) converts through turrets to 15-day, 16-day, 24-day, 30-day and 31-day rotation.



ROCKWELL MIDGET DRIVE

This mighty mite fills the need for a small size, strongly constructed drive in instruments where space is at a premium. Features include detachable escapement sealed in clear plastic, phosphor-bronze bearings. Has separate mounting ring with adaptors for flexible installation. Two models—8-day wind, 24-hour rotation and 24-hour wind and rotation. Turrets for changing rotation speeds provide almost universal application.

WRITE FOR BULLETIN 1079

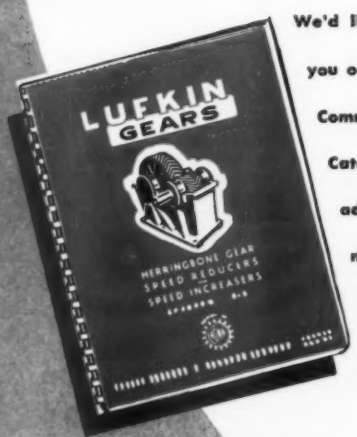
Pittsburgh Equitable Meter Division
ROCKWELL MANUFACTURING COMPANY
Pittsburgh 8, Pa.

Atlanta Boston Chicago Kansas City Los Angeles San Francisco

Columbus Houston New York Pittsburgh Seattle Tulsa

XUM

For the cost-minded thrifty . . . it's Lufkin in '50



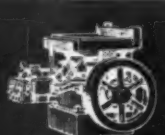
We'd like to send you our newest Commercial Gear Catalog. A card addressed to our nearest office will bring it post haste.

COSTS . . . first costs . . . . operating costs . . . . maintenance costs are going to be most important in the days ahead. Lufkin maintains that their equipment has the lowest operating and maintenance record in its field today. Our engineers will gladly give you the facts upon request to our nearest office. Why not investigate today?

Lufkin FOUNDRY & MACHINE COMPANY
LUFKIN, TEXAS
Branch sales and service: Houston, Dallas, New York, Tulsa, Los Angeles, Seminole, Oklahoma City, Corpus Christi, Odessa, Kilgore, Wichita Falls, Casper, Wyoming, Great Bend, Kansas

Lufkin Equipment in CANADA is handled by
THE LUFKIN MACHINE CO., LTD.
14321 108th Avenue, Edmonton, Alberta, Canada

LUFKIN PUMPING UNITS


LUFKIN-COOPER-BESSEMER ENGINES

LUFKIN OIL FIELD AND INDUSTRIAL TRUCK TRAILERS

INDUSTRIAL SPEED REDUCERS AND INCREASERS

DIVISION LUFKIN FOUNDRY & MACHINE COMPANY

XUM

DEMPSTER DUMPSTER SYSTEM

SERVING COST-MINDED MANAGEMENT FROM COAST TO COAST

. . . handling bulk materials of every description at phenomenal savings

Photos show the three simple stages of servicing a container. The Dempster-Dumpster, operated from hydraulic controls by driver in the cab, picks up each container and hauls it to point of disposition where it may be dumped or set down intact.

GULF – *recognized across the nation*

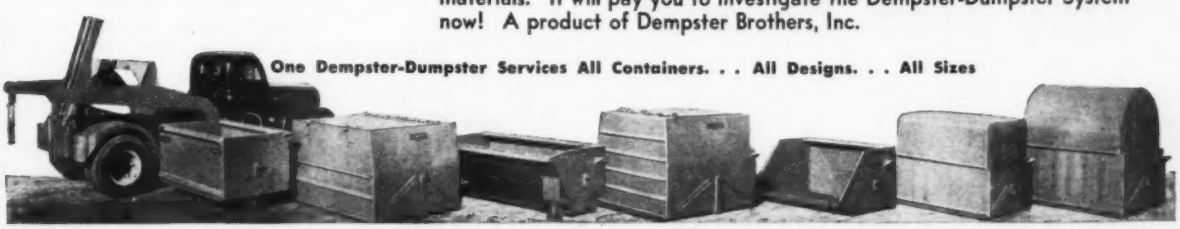
. . . Gulf Oil Corporation, well known for sound management, uses the Dempster-Dumpster System

Gulf Oil Corporation is among the hundreds of well managed manufacturers, both large and small, who use the Dempster-Dumpster System of bulk materials handling . . . the system recognized across the nation for its efficiency and ability to reduce costs.

There is never an idle moment for a truck mounted Dempster-Dumpster around a manufacturing plant. With a variety of Dempster-Dumpster containers spotted inside and outside your plant, one Dempster-Dumpster, with only one man, the driver, is kept busy servicing one pre-loaded container after another. These detachable containers, ranging in size up to 12 cu. yds., carry pay-loads equal to conventional truck bodies. They are built in a wide variety of designs best suited to the type of materials handled—be they bulky, light or heavy . . . solids or liquids . . . trash or rubbish.

In addition to amazing increases in man-power efficiency . . . greatly reduced investment, and maintenance costs, the Dempster-Dumpster System improves "housekeeping" methods . . . reduces fire hazards . . . provides an easier, quicker, safer and more efficient manner of handling materials. It will pay you to investigate the Dempster-Dumpster System now! A product of Dempster Brothers, Inc.

One Dempster-Dumpster Services All Containers. . . All Designs. . . All Sizes



DEMPSTER BROTHERS, 580 Dempster Building, Knoxville 17, Tennessee

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BOVAIRD STORES *are* SERVICE CENTERS *for* OIL FIELD SUPPLIES

Quality and dependability of supplies and equipment are important; so is field and supply store service. Bovaird represents a complete line of the most dependable factory-tested and field-proven equipment and supplies; Bovaird offices and stores — twenty-one of them — are strategically located in Illinois, Kansas, Oklahoma and Texas to best fill your needs — intelligently — economically — quickly. Always . . . "Buy From Bovaird."

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THE Bovaird SUPPLY CO.

GENERAL OFFICES
TULSA, OKLAHOMA

MEMBER PETROLEUM EQUIPMENT SUPPLIERS ASSOCIATION

They Say—

Who's Afraid of Profits?

"Too often nowadays we see and hear the word 'profits' bandied about by certain biased interests in a manner intended to convey the impression that the whole idea is pretty shameful. . . . They conveniently forget, however, to mention what percentage the profits bear to total investment.

"Let's be realistic. Profits are need ed. . . . There is something even beyond that. There must be a reserve to replace machinery and equipment . . . to develop new products demanded by changing times.

"No industry can stand still and remain successful. Had the refineries not been prepared financially and otherwise to make the swing from kerosine to high-octane gasoline, je and diesel fuels, synthetic rubber, and countless products, they would have passed out of the picture with the manufacturers of buggy whips and harness oil.

"Let there be no mistake. Profits are not only 'respectable,' but are vitally necessary."

Editorial in The Esso Refiner, publication of Esso Standard Oil Co.

In Defense of Imports

"Since 1945 we, along with other utilities, have been waging a constant fight to avoid the necessity of raising our rates to our customers, a losing fight insofar as our gas companies are concerned, I am sorry to say, until, in the past year, we were able to take advantage of the dropping oil prices. By pooling our system requirements and arranging for transportation in leased tankers direct from the oil fields and conversion of boilers to use oil, we have made material savings in our fuel costs. It would be discouraging to say the least, to lose this advantage were domestic oil prices to be increased as a result of an artificial restriction of the imports of foreign oil, and it would penalize the power users of New England."

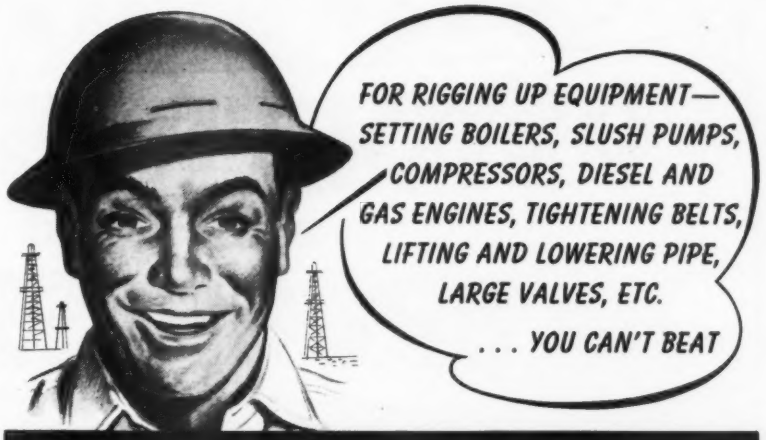
F. D. Campbell, president, New England Gas & Electric Association, in a letter to Rep. Angier L. Goodwin of Massachusetts.

Big Risk

"The builder of the pipe line takes a very definite risk because he has no guarantee as to the volume of oil that can be transported from any particular field.

"There is no guarantee that any specific pipe line will repay the cost of construction. The useful life of a crude line is problematical."

Ben Eaton, Sun Oil Co. land de-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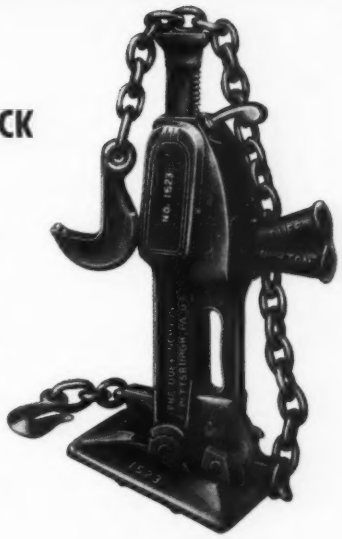
LARGE VALVES, ETC.
. . . YOU CAN'T BEAT

DUFF-NORTON JACKS

THE 4-WAY AUTOMATIC LOWERING JACK

The hinge or pivotal base of this Duff-Norton 4-Way Jack permits operation of the jack from any angle for lifting, lowering, pushing or pulling loads weighing up to 15 tons. Sturdy steel chain fits into slots on top of jack and can be used as a sling to engage heavy objects being lifted or lowered. Convenient to handle and spot, this jack can be operated by one man.



No. 1523

QUICK REFERENCE DATA

Jack No.	Capacity Tons	Height Inches	Raise Inches	Base Inches	Head Inches	Foot Lift Ht. Inches	Weight Pounds
1523	15	23	12½	7½x10¾	3x3	2¼	98

Furnished with steel operating lever 1¼" x 48" long, and 5 feet of ½" BBB chain (13¾ lbs.)

STRENGTH SAFETY DURABILITY
DUFF-NORTON JACKS
ESTABLISHED 1883

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"The House that Jacks Built"

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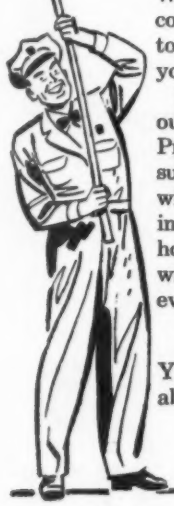
proclaimed
OIL PROGRESS WEEK



Here's how you can make this nationwide event produce results for YOU!

October 15th-21st will be Oil Progress Week throughout the nation. In your own community it's the time when people look to *you* for a report on the progress you and your industry have made.

Last year thousands of oil men throughout the country took advantage of Oil Progress Week to tell their story—with results that paid handsome dividends in good will and good business. This year it is more important than ever for you to explain how you are helping to provide America with *better* oil products . . . higher-than-ever standards of service.

You're the Winner!

YOU benefit when your customers know about the progress that results from competition in oil. YOU gain when they realize how you compete with rival companies to win customer approval. For as the public learns what a great job you're doing they'll understand that your business freedom means *more* oil products, *better* oil products, better service for *them!* Get people better acquainted with your business—your problems and your achievements—and you create good will that's sure to pay off for you and your firm in the long run.

Oil Progress Week comes just once a year, but it can benefit you the whole year through.

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Don't miss this chance to win new friends in your community!
Make OIL PROGRESS WEEK Your week!

partment, speaking before a transportation seminar at West Virginia Wesleyan College, Buckhannon, W. Va., July 28.

Cheap Energy

"Without cheap fuels our cherished standard of living would vanish. We might still have the same machines, but we could not afford to use them to the extent we do if energy were much more expensive. The energy consumption in the United States amounts to the equivalent for each of us of a motor with 10 hp. working constantly, 24 hours a day, 365 days a year. . . .

"Oil and gas supply about 60 per cent of the mineral fuel in the United States and coal supplies the remaining 40 per cent. This represents quite a change within the past 20 years, for as late at 1929 coal supplied two-thirds of the mineral energy in the United States and oil and gas together supplied only one-third. But the competitive, aggressive petroleum industry has done a remarkable job during the last 20 years in discovering and developing new oil and gas resources. In fact, all of the increase in energy consumption in 1949 as compared with 1929 has been supplied by oil and gas, whereas coal actually supplies less energy now than in 1929.

The principal reason for the change has been price. Coal has increased in price to such an extent that for some uses, and in many areas, it is not only less convenient but also more expensive than oil and gas. Considering the convenience and cleanliness of oil and gas as fuels, they have remained very attractively priced even during the postwar years when rapidly rising demand and costs have increased commodity prices substantially. . . .

"The public welfare can best be served by continuing the circumstances which have made it possible for the petroleum industry to develop large new resources and to supply its convenient fuels at prices that are extremely attractive in relation to competitive fuels and to commodities generally."

The Humble Way, Humble Oil & Refining Co.

To the Rescue!

"There is only one way to save economic freedom in this country, and that is for each of us to be an active member of the rescue party. . . . It is not enough merely to tell the people what we believe. We must show them what we believe—by our actions, by our attitude, by our display of faith and interest in the system under which we live."

Baird H. Markham, director, American Petroleum Industries Committee, American Petroleum Institute, in a speech before the Sixth Annual Conference of Presidents and Other Officers of State Medical Associations, San Francisco.

BENCH YOKE VISE

that's a real Time Saver

. . ."I don't have to worry about protecting polished pipe in these RIDGID LonGrip Vise jaws."

LonGrip Jaws Protect Polished Pipe in RIDGID Vises

● You get years of trouble-free service with this more-for-your-money RIDGID Bench Yoke Vise. You like its easier-work features—integral pipe rest, handy bender that won't flatten pipe and LonGrip jaws that protect polished pipe. Special malleable frame and heat-treated tool-steel jaws for maximum wear. Made in 8 sizes, for pipe to 6." RIDGID bench, post, stand and Tristand pipe vises, yoke and chain types, all offer you real work-saver advantages. Buy them at your Supply House.

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WORK-SAVER PIPE TOOLS

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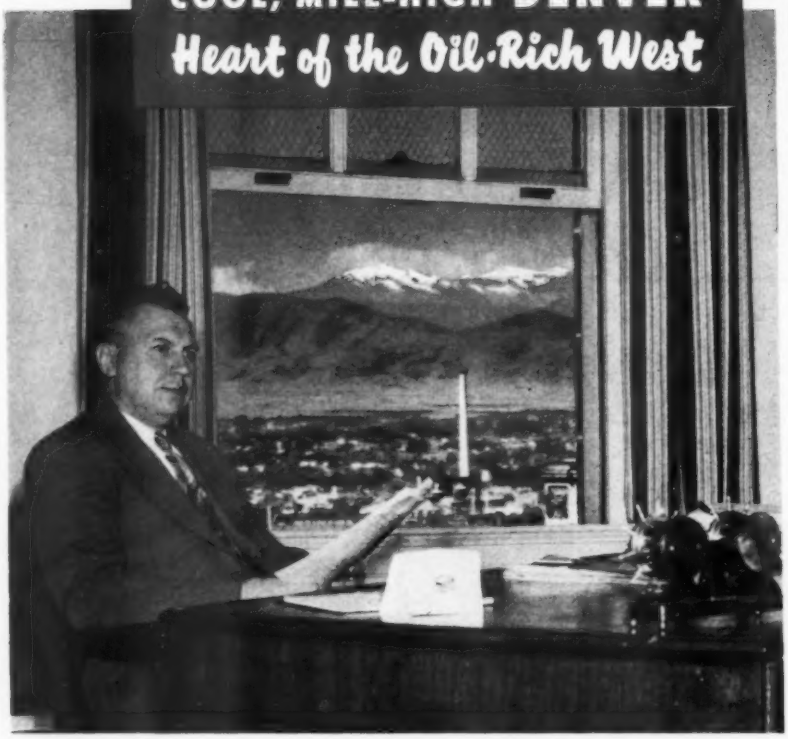
Oil Men! HEADQUARTER IN
COOL, MILE-HIGH DENVER
Heart of the Oil-Rich West



Denverites live in a city kept delightfully cool by snow-washed mountain air. (August mean temperature, average over 78 years, 71.4 degrees.)

DENVER, major metropolis of the vast new Rocky Mountain oil empire, invites you to locate where pleasurable living is combined with profitable, fast moving business opportunity.

WHY MORE OIL MEN NOW HEADQUARTER IN DENVER

- Center of public land activity. Close to all important fields.
- In the middle of vast new oil areas—containing the greatest percentage of recent discoveries in the United States.
- Excellent transportation by air, train, or car to all points.
- Convenient interrelations with other oil companies.
- Good supply of intelligent help at fair wages.
- Fine schools—modern housing—and a variety of unexcelled recreational facilities for all ages.

Write Carl E. Berg, Industrial Director of the Denver Chamber of Commerce, for specific details on how your business could move to Denver — or write one of your own personal friends in Denver.

Industrial Development Council
DENVER CHAMBER OF COMMERCE
CHAMBER OF COMMERCE BUILDING, DENVER 2, COLORADO

Fuels in a War Economy

"Competent opinion is to the effect that the United States could fulfill its wartime essential needs for liquid fuels. . . .

"Of foremost importance is the apparent belief that crude-oil reserves within the Western Hemisphere are adequate. Texas has a shut-in reserve which approaches 1,000,000 bbl. daily. An even greater consideration, however, in the new and large potentiality of western Canada's oil reserves. It is this substantial new field which has veered so much thinking away from the prospect, which seemed so real in 1945, that the United States might be compelled to create hastily and at great cost a synthetic-fuels capacity based on coal and oil shale. . . .

"If war comes, the oil industry would be ready, and managing its own affairs on the basis of experience, efficiency, knowledge and social responsibility. Private enterprise can do it best."

Excerpt from "Fuels in a War Economy," appearing in the July 28, 1950, issue of the Guaranty Survey, Guaranty Trust Co. of New York.

Tidelands Suggestion

Sir:

On the subject of tidelands oil royalties, congressmen can make many friends if they will release the overriding royalties impounded pending settlement of the disputes and will recognize all existing operators' contracts as valid.

The only item in dispute would then be the basic royalties, which can be settled later.

Frank N. Bosco,
Consulting Petroleum Engineer,
Denver, Colo.

Joint Efforts

"In view of the situation this country is facing and the importance of oil and gas to the national security and defense and to the maintenance of our essential civilian economy, the joint efforts of the Government and the petroleum industry are necessary to assure that we will have adequate information and be properly prepared to meet the oil and gas requirements of any emergency."

Sec. Oscar L. Chapman in letter to NPC.

Sees Steel Controls

"I'm afraid there are going to be some controls (on steel), though voluntary. It's just inevitable.

"The steel industry is pretty well integrated. The Government wouldn't have to control prices. There are so few of them (steel companies), and they feel so vulnerable to public opinion and criticism."

Dr. John R. Stockton, professor of business statistics and acting director of Texas University's Bureau of Business Research, Austin.

"Easiest pipe to run I ever handled..."

—says an Illinois driller

". . . EVERY JOINT STABBED AND RAN PERFECTLY," stated this Illinois driller after running 2960 feet of 5½-inch, H-40 Republic Electric Weld Casing in just two hours, thirty-five minutes. He calls it, "the easiest pipe to run I ever handled."

Yes, easy does it . . . fast—and *safely,* too, when you're running Republic Electric Weld Casing.

Manufactured under Republic's *advanced* Electric Weld Process, these high ductility steel walls are uniformly thick, uniformly round and sound. They're full normalized for uniform structure and cold sized for high yield strength. They offer top resistance to the dangers of collapse.

A uniform depth of tough steel under thread roots all around the pipe helps protect strings against pull-outs.

Hoisting long lengths of Republic Electric Weld Casing onto your derrick floor is your assurance of easy handling, plus complete protection. Specify it with confidence.

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"When I put an oil well in someone's hands for perforating, I want to be sure my investment is safe. I want savvy on the job, know-how, experience . . . and the Lane-Wells crews have it, seventeen years of it."

"I want the shots put where I order 'em, and Lane-Wells hits those measurements right on the nose."

"I want the job done *safely*, without damage to the well or injury to men . . . and Lane-Wells' equipment and operating methods are as fool-proof as they can be made."

"Finally, I want results, which means, of course, penetration . . . and Lane-Wells delivers that penetration and *gets results!*"

THAT'S WHY LANE-WELLS DOES MY PERFORATING

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TECHNICAL OILFIELD SERVICES

Better Perforating

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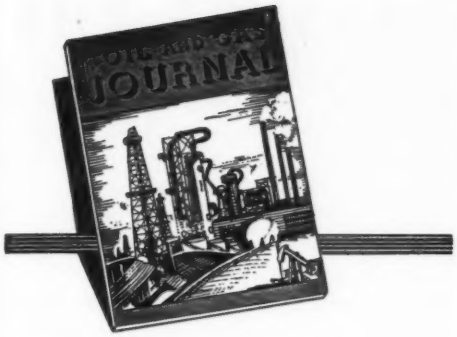

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JOURNALLY Speaking

Some Brochure

OUR advertising men, for the most part, stick strictly to their own knitting and seldom venture into the creative side of journalism, but this week the editorial department took off its collective hat to them for turning out a piece of work which would do credit to any editor.

It's a handsome, 52-page brochure on "The Oil and Gas Industry and Its Leading Publication." The second half of that title is a tip-off that the ulterior motive is to sell advertising in guess what magazine, and it does that job with all the subtlety and display type for which the advertising profession is noted.

But it does a lot more than that. The first half of the booklet lives up to the first half of its title, and it really is a capsule handbook on the petroleum industry and how it operates. If our editors had 52 pages to describe the oil industry they probably would have filled them pretty solidly with detailed statistics and technical jargon. But not our ad boys. They love white space, color splotches, headlines, pictures, and graphs. As a result, he who runs may read their booklet in almost nothing flat and still get a very informative concept of the size and structure of the industry.

Here's a sample, the entire reading matter of a two-page spread minus the pictures and color blocks:

"How is the industry meeting the demand for finished petroleum products? . . . Pipe Line—World-wide construction under way or scheduled totals over 40,000 project miles (not including almost that many more miles of field gathering lines); 5-year program of this size or larger in sight. Refineries—Spending about $1,000,000,000 a year for new construction and maintenance. Field Gas Processing — Adding 1,000,000,000 cu. ft. daily to producing capacity this year; trend sharply upward."

How's that for a thumbnail sketch? The whole book is full of similar nuggets of knowledge. We're not plugging it just because of the nice things it says about the editors' work or the array of handsome mugs of the entire editorial department which alone is worth the price (it's free). If you would like a copy we're sure the advertising department would part with one for the asking, particularly if you say you learned of it from this page.

Third Round

THIS Korean incident may or may not be war, but apparently Washington is acting as in wartime, for Bert Linz memos from the Capitol:

"There is really nothing going on here except confusion. Nobody knows what's going to be done and so everybody wraps himself in a cloak of secrecy and looks wise, important, and busy."

If it is war, Journal readers can be sure they will get prompt and authoritative information and interpretation from our Washington editor. Bert covered oil and other business news in Washington during World War I and again during World War II, as well as during the only slightly less hectic interbellum periods, so he is not apt to be surprised by anything that can happen along the Potomac.

So this is Bert's third round of it, and what is happening in Washington these days must give him a "this is where I came in" feeling.

Pepper Upper

IT has been remarked editorially that in planning for a war people tend to think in terms of the last war. We have had an example of that right in our own shop. One of our colleagues, reading the war-scare headlines, rushed out and stocked up on a whole war's supply of the commodity he was shortest of last time—two 20-cent cans of black pepper. Shame on him, the dirty hoarder.

—Henry D. Ralph.

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SELECT CEMENT TO FIT THE JOB

● Modern testing methods in the laboratory mean better cementing jobs in the field. That is a basic reason why 'Starcor', pre-tested intensively ever since its introduction to the Oil Industry 15 years ago, assures outstanding performance when put to work in the oil well.

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The Welex Torpedo-Jet process is the first and only method ever developed for accurate, *selective* open-hole shooting. Through careful selection of zones to be shot and precision shooting with Torpedo-Jets, the operator maintains control over his well, much in the same manner as in casing perforating. Selective shooting with Welex Torpedo-Jets has made profitable producers out of hundreds of wells, both old and new. Welex service engineers can give you specific technical information on many problems successfully solved by Torpedo-Jet shooting. And Welex *customers* can tell you that Torpedo-Jets get the job done faster, better, and at lower cost than other methods of open-hole shooting. For prompt service, day or night, call on Welex . . . the originators of the Jet process.

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Octane Conservation

This country has been prodigal with octanes, using that term loosely to cover all refinery fractions and synthesized chemicals which give high power and antiknock characteristics to motor fuel.

In recent years automotive designers have vied to produce engines with high compression and surplus power chiefly for the convenience and pleasure of the motoring public. These are essentially luxury motors, and they require a luxury fuel. The full power and efficiency of engine and fuel are utilized only a part of normal driving time. Little thought has been given to getting the maximum power out of the petroleum fractions which can be used as motor fuel.

This probably was all right in peacetime, although the octane race was putting quite a strain on many refiners. But now octanes must go to war. Already the Government has asked refiners to channel all available alkylate into aviation gasoline and to seek ways of increasing the output of aromatic blending agents. This may be only the start.

At the peak of World War II the military consumed more than 600,000 bbl. of aviation gasoline daily, very little of it higher than 100 octane. An air force the same size but with larger planes would require more fuel, most of it in the 115-145 range. Refiners who recall the terrific struggles and drastic improvisations required to meet avgas requirements during the war may well wonder how similar requirements could be met now that civilian motor fuel is taking so much of the premium cuts of a barrel of crude.

An immediate solution is a decline in the top octane ratings of motor fuel, causing some annoyance to drivers of late-model cars. But if the petroleum and automotive industries must anticipate several years of a chronic shortage of octanes, this expedient may not be sufficient.

Sooner or later we may be faced with the need for a national program to conserve our octanes, that is, to utilize more of the potential power in petroleum. This need not involve scrapping present high-compression engines, but might halt the rush to put new models into production. There are many other possible changes, not too radical, in the design of engines and fuel systems and in gasoline specifications which would give more miles per gallon, on a national basis. One example is a change in volatility specifications to permit greater use of natural gasoline.

The military has a big part in this. In the last war it wasted many octanes by specifying a high-grade gasoline for all its vehicles even though only a few of them needed it or could utilize it to the greatest efficiency.

Because of the many factors involved and the impossibility of widespread changes in existing automotive equipment, octane conservation is a long-range problem, requiring the best thought and cooperation of the automobile and petroleum industries and the Government. The problem is serious enough to warrant a start on it now.

XUM

THIS WEEK

CONTROLS—Mobilization plans move slowly in Washington despite surface frenzy. . . . But it appears that industry controls will not be as drastic as first believed. . . . ¶Legislation gives President elastic authority, so controls will start loose but tighten progressively. . . . ¶Defense Production Authority will be set up in Commerce Department. . . . Officials there hope to operate on skeleton controls and voluntary cooperation. . . .

WASHINGTON—Oil and gas industries continue battle against provision in pending renegotiation bill which would subject raw fuels to repricing if used to produce government supplies. . . . ¶New regulations on leasing federal acquired lands provides for fractional and future interests. . . . ¶Navy rebuffed on plan to charter tankers with view to stimulating construction of big, high-speed vessels. . . .

TIDELANDS—Defense emergency speeds up federal jockeying to get control of offshore oil. . . . Defense Production Act eyed as possible vehicle. . . . ¶O'Mahoney's "interim" regulation bill is strongly opposed by oil-industry spokesmen. . . . But endorsed by Interior Department. . . . ¶Texas and Louisiana protest federal interference in offshore oil operations made in guise of navigation regulations. . . .

INDUSTRY—Unique public-relations plan helps Southern California Gas Co. lay pipe line through city streets without complaints. . . . ¶Success announced in first commercial trial of propane storage in man-made underground reservoir. . . . Cavity was washed out of salt bed with fresh water. . . . ¶Annual IOCC survey shows stripper wells account for 13 per cent of nation's crude production. . . .

ACTIVITY—Crude production for week ended August 12 averaged 5,598,550 bbl. daily, up 30,150 bbl. daily over previous week. . . . ¶Well completions for the week totaled 877, up 11 wells over previous week and 164 wells over same week last year. . . . Wildcat completions dropped 19 wells from previous week to 169 or 38 wells more than same week in 1949. . . . ¶A total of 2,185 rotary rigs were operating in United States on August 7, an increase of 9 rigs over previous week and 231 more than were operating at same time last year. . . .

INTERNATIONAL—I.P.C. and Iraq Government reach agreement increasing royalty 50 per cent. . . . ¶Egypt grants exploration licenses to three oil companies but has not yet set acceptable conditions for foreign capital. . . . Plans second government-owned refinery. . . . ¶Italian propane industry expanding rapidly. . . . ¶Unrest in Burma still prevents reconstruction of oil properties. . . .

TRENDS—Total refinery demand for distillate fuels in the 4-week period ended August 5 was 24.8 per cent greater than in the same period last year. . . . Gulf-East Coast distillate demand was up 18.5 per cent. . . . ¶Distillate stocks are 9,665,000 bbl. less than they were at this time last year with 7,033,000 bbl. of the decrease reported for East Coast. . . . East Coast stocks were 8,126,000 bbl. below year earlier level on May 6. . . .

REFINING—Government asks refiners to survey ways of increasing output of aromatic blending agents for aviation gasoline. . . . ¶New York City's smoke-control plan calling for limitation of 2 per cent sulfur content is amended as a result of sharp attack by oil, other interests. . . . ¶Construction begun on J. M. Huber Corp.'s $1,500,000 carbon-black plant at Baytown, Tex. . . . ¶Sid Richardson Refining Co.'s Texas City, Tex., plant to reopen soon. . . .

PIPE LINES—Plantation Pipe Line will use 14 and 18-in. pipe in looping Louisiana-Carolina products system. . . . ¶Richfield announces final leg in 14-in. crude line from Cuyama Valley to Los Angeles. . . . ¶Mississippi River Fuel Co. given FPC authorization to construct 40-mile, 18-in. line in Louisiana. . . . ¶Construction in progress on Winnipeg Pipe Line Co., Ltd.'s 75-mile, 10-in. crude-oil line from Gretna to Winnipeg. . . . ¶Work progressing by Bechtel Corp. crews on Interprovincial Pipe Line Co. spreads in Canada. . . . ¶FPC approves 20-mile, 22-in. natural-gas line of Prince Georges Gas Corp. . . .

NEW DEPTH RECORD.—The deepest producer east of the Rockies was completed last week by Shell Oil Co. in Weeks Island field in Vermilion Bay, Iberia Parish, Louisiana. It is the 2 Weeks Gail State Unit, and flowed 538 bbl. of 30°-gravity crude daily through a 13/64-in. choke from perforations at 15,122-37 ft. It was drilled by this rig, one of the most powerful ever mounted on a barge, and especially designed by Shell for conditions in this very deep field. The world's deepest producer is Standard of California 5 Mushrush, Wasco field, Kern County, California, completed in 1949 at 15,250-15,530 ft. The previous depth record for Louisiana production was the Humble 1 State Lease 1452, Lake Raccouri field, Lafourche Parish, completed in 1949 at 14,467 ft.

Elastic Controls

Administration gets flexible powers over materials and inventories, but pattern of regulation is still vague

Bertram F. Linz

WASHINGTON.—Congress this week is putting the finishing touches to an elastic control bill designed to meet both the immediate need for machinery to channel scarce materials to military production and any possible future need for price and wage control and rationing.

The bill that will go to President Truman for approval is more in line with his original recommendations than the measure which Republicans and southern Democrats sought to put through the House of Representatives some days ago, which would have made price control mandatory when the Bureau of Labor Statistics price index topped the pre-Korea level by 5 per cent.

Under the bill that now appears likely to receive congressional approval the President will be given the authority he sought to impose priorities and allocation of materials, control inventories, regulate credit, and provide government assistance to industry in constructing plants and facilities needed for military production.

He will also be given authority, when he deems it necessary, to impose price and wage controls and rationing, powers which he has maintained are not needed at this time.

The DPA.—Meanwhile, only the barest hint of how the authorities to be granted by the Defense Production Act might—but not necessarily will—be exercised has been given by the administration. That hint is that a Defense Production Administration will be established in the Commerce Department. Beyond that there are only the personal ideas of commerce officials as to how the DPA should operate, namely, that while allocation of scarce and vital materials should be imposed immediately, voluntary methods should be used to the fullest extent possible pending the development of an adequate program for limitation of consumption for unnecessary purposes, conservation orders, and priorities.

These officials also believe that inventory control should be applied first and so far as possible at the manufacturing level, and extend to wholesale and retail levels only if and when necessary. Inventory reports, they say, should be as simple as possible and required only in the case of vital materials.

Taxes.—Following enactment of the Defense Production Act, Congress will get down to the question of taxes, with increased rates for both corporations and individuals inevitable and an excess-profits tax designed to wipe out war profits possible but not likely. But an excess-profits tax now is seen as slated for enactment early next year, together with other changes in the tax law designed to act as a further brake upon inflation by taking money out of circulation.

Tankers.—Navy plans to encourage private construction of tankers by entering into 20-year charters for new high-speed, large-capacity vessels were scuttled last week when the House armed services committee dropped the matter after learning from the Budget Bureau that the idea was not in conformity with the President's program, and if the Navy needs new oilers it would be better for the Government to build them.

Studies.—Other developments of the week included Senate rules committee clearance for floor action of the Myers resolution providing for a comprehensive investigation of all fuels other than atomic energy; a decision by the Senate finance committee that the increase in corporation taxes asked by the President should apply only to income developed after July 1, 1950, and not to that of the entire year; and an objection by Sen. Elmer Thomas of Oklahoma which prevented the Senate from acting on the Ferguson resolution for an investigation of gasoline prices.

The Myers resolution was selected from a number of investigative proposals laid before the committee. It calls for a full and complete investigation and study of the available fuel reserves of the country and the present and probable future rates of consumption thereof; formulation of a national fuel policy to meet the needs of the United States in times of peace and war; and recommendation of methods of encouraging developments to assure the availability of fuels adequate for an expending economy and the national security.

Government oil.—During the course of the Senate debate on the Defense Production Act it was made clear that the authority to be granted the President to set up corporations with a borrowing power of $2,000,000,000 to aid in the development of plants and facilities for war production does not include the power to put the Government into business.

The question was first raised by Sen. Russell B. Long of Louisiana, who asked Chairman Burnet R. Maybank of the banking committee whether the power given the President to make provisions for the exploration, development, and mining of critical and strategic minerals and materials might not give him the right, which he does not now possess, to develop or lease the tidelands.

"There never was the slightest thought on the part of the committee that the tidelands oil, which raises a debatable and argumentative question, should be involved in this bill," Maybank said. "That was my understanding, and that I believe was the understanding of the administration."

The subject was carried further by Sen. Kenneth M. Wherry of Nebraska, who asked whether, in the event that fuel should become short, the Government would have the power to "prospect for oil, or dig oil wells, and to acquire fuel oil" if the Government felt it was in the interest of national defense to do so.

Answering Wherry, Sen. John J. Sparkman of Alabama asserted there is nothing in the bill that would permit the handling of anything having to do with oil, nor, he added, steel or any other commodity. "Nothing in this bill authorizes the Government generally to go into the production of anything," he said.

Avgas.—In the second appeal for increased aviation-gasoline production within a week, Interior Secretary Oscar L. Chapman called for increased production of aromatic blending components such as toluene.

Requesting refiners to eliminate the use of aviation alkylate in motor gasolines, Chapman said that on the basis of current trends the demand for aviation gasoline by the first quarter of next year will require increased production of aromatic blending materials.

However, he added, surveys by the Military Petroleum Advisory Board of the industry's capabilities indicate that progress is being made to meet the increased aviation gasoline needs.

Chapman said he has been advised by the board that on a nation-wide basis the production and blending into aviation gasoline of 1,000 bbl. per day of toluene would be the equivalent of increasing alkylate production by almost 2,800 bbl. a day.

A questionnaire seeking data on current and potential production of aviation gasoline and components is now being sent to avgas producers by the Military Petroleum Advisory Board for return to the Munitions Board Petroleum Committee before the end of this month.

XUM

Repricing Opposed

Leaders of oil industry voice alarm at federal plan to include petroleum products in renegotiation bill

WASHINGTON.—Spokesmen for the oil and natural-gas industries joined with other producers of natural resources last week in an appeal to the House ways and means committee to eliminate provisions in legislation now before it which would subject raw materials entering into production under government contracts to renegotiation.

The case for the two industries was submitted by R. G. Dunlop, president of Sun Oil Co., Philadelphia, representing the American Petroleum Institute, Western Oil and Gas Association, and Mid-Continent Oil and Gas Association; C. H. Murphy, Jr., president of the Murphy Corp., El Dorado, Ark., representing the Independent Petroleum Association of America, and W. E. Disney, Washington, general counsel for the Independent Natural Gas Association.

Declaring that extension of renegotiation to crude oil entering into production for the Government would result in an intolerable situation, Dunlop reminded the committee that the wartime and present renegotiation laws, which specifically exempt crude oil and gas, have worked all right. But, he warned, less than 50 per cent of the crude production is required for military products and if crude is to be renegotiated there will be a tendency on the part of the smaller producers to shun sales to government-contract refineries and sell to refineries producing for civilians.

Would divert supply.—Dunlop emphasized that such a shift would not be due to lack of desire to cooperate with the Government and help win a war but to the realities of a situation which would make it necessary for producers to set aside a substantial part of their income against possible renegotiation and thus restrict funds available for exploration and development of new properties.

Even with crude exempted, Dunlop testified, application of the wartime renegotiation act to the oil industry presented an unusually difficult task due to the problem of accurately determining the cost of a given product out of the variety of those refined from the same barrel of crude.

"Intricate and complex though the task was with crude oil exempted from negotiation," he said, "it was simple compared with what the renegotiators would have to face if crude-oil prices are to be included. It would be the opening of a real Pandora's box of troubles that would overwhelm the renegotiators themselves, as well as the industry."

Dunlop explained that while the number of refiners is limited—only approximately 120 were engaged in manufacturing aviation gasoline or components for the armed services in the last war—they obtain their crude from thousands of sources, frequently after it has passed through several hands. Oil from numerous producers is commingled in storage and transportation from the field to the refinery, and it is an absolute impossibility most of the time to say with any certainty who produced a given volume of crude. Further, he said, there is no way of segregating crude in a refinery so as to show what proportion of product from a given batch represented a government contract.

Costs too involved.—So far as the producers are concerned, their cost is not only the current expense for lifting oil but goes back to exploratory and development efforts frequently covering a period of years, and allocation of those costs to a given amount of production, without knowing the life of the well and the amount of oil that ultimately would be recovered, is impossible.

"Under such procedure the producer would be in a dilemma as to how much of the price he charged the refiner would be recaptured by the Government — perhaps for several years," Dunlop pointed out. "Thus, he would have no alternative but to tie up in reserve funds, until final determinations are made, a substantial part of the sums he receives for his oil. For all practical purposes the producer would be financially paralyzed insofar as continuing exploratory work for new oil is concerned."

Further, Dunlop said, the producer has royalty holders whose share in his production usually is distributed monthly, and would be faced with the choice of attempting to enforce refunds should his selling price be scaled down or withholding royalty payments until the contract is finally settled.

Disruptive effect.—The position of the producer was dwelt upon in more detail by Murphy, who warned the committee that the proposed provisions would "have a disruptive effect upon the producing branch of the petroleum industry, hampering exploratory and development activities, and tending to endanger the adequacy of oil and gas supplies for our national needs."

Crude oil and natural gas have a wide civilian use both in peacetime and wartime, with prices established under strong competitive conditions, Murphy said, and this provides ample protection against unwarranted or unreasonable profits on the part of producers "unless circumstances develop to the extent that normal competitive forces throughout our economy are not effective." In that event, he commented, Congress might establish general price controls; but if the contemplated legislation is passed there could be conflict between the price-control authority and the renegotiation board, with the producer in the middle.

"The nature of the oil and gas producing industry is such as to render difficult any accurate determination of cost until the particular operation is concluded," Murphy asserted. "The field may produce more or less than originally estimated. Since the cost per barrel can only be accurately determined by a division of total operation costs by the barrels produced, this determination cannot be proper until after the exhaustion of the field.

"Furthermore, costs in the case of crude oil and natural gas must be considered on the basis of replacement rather than merely the historical costs. Replacement cost is the cost of finding and developing new oil reserves to replace the oil currently being produced. The oil producer must operate on the basis of his replacement cost if he is to continue in business and not find himself in a process of liquidation.

Historic record.—"The nature of the petroleum-producing industry and its widely established place in our peacetime civilian economy render the application of the principle of renegotiation unnecessary and impractical as to crude petroleum and natural gas," Murphy concluded. "The method of sale and trade of oil and gas is widespread and of long standing. Under this method the level of prices of oil products has historically been relatively lower than other basic commodities. In the United States oil products also have been cheaper than in other countries. This in spite of a much higher standard of living here than elsewhere. This record should provide assurance that the Government would suffer no injury through the continued acceptance of the price for the raw materials of oil and gas as established in the open market."

Pointing out that nearly all natural gas sold in the trade is now under regulation by state and federal authorities and the Federal Power Commission is claiming the right to regulate the price for which pipe-line companies may purchase gas in the field, Disney told the committee that few instances exist where renegotiation could be applied, such as so-called direct sales or where fractions such as butane are extracted from the gas for the manufacture of gasoline.

Direct sales of gas to war-material manufacturing plants, Disney contended, are generally at lower prices than those fixed by regulatory authorities, and no good purpose would be served by removing the exemption

WATCHING WASHINGTON

Bertram F. Linz

Controls Preview

No definite outline of the plan to be followed in the imposition of controls under the Defense Production Act will be possible until operations actually get under way, but H. B. McCoy, director of the Office of Industry and Commerce, has aired his views in talks with industrial groups, and since he is the man who will direct priorities and allocations his ideas will be of interest.

While the Government will seek to keep mandatory controls to a minimum, according to McCoy, such action appears inevitable in the case of such commodities as steel, copper, zinc, aluminum, and nickel, all metals vital to war production and of which there is little or no surplus.

The agency is likely immediately to undertake a business-inventory-control program, because of evidence that some industries have been buying excessively.

The best way to avoid mandatory controls, the Commerce official believes, is for business and consumers to refrain from hoarding. But in any event, before any action is taken in regard to such controls the department will consult with representatives of the industries to be affected.

Frenzy Abating

The confusion that marked Washington in the first days of the Korean war is gradually clearing up, and the sky-high estimates of what it would take to lick the Reds over there are rapidly being deflated by Defense Department officials.

At the Pentagon, where the military high command holds forth, it is now figured that the new rearmament program will involve a 50 per cent increase in the armed forces' steel take, but since they now take only about 4 per cent of the total output that won't put a very serious dent in the civilian economy. A lot of the steel needed for military use could be had by cutting out production of juke boxes, slot machines, and other equally nonessential items, in all probability.

While the military requirements of the near future will not put much strain on steel supplies, the demand for the metal by manufacturers anticipating defense orders and by those seeking to produce as much civilian goods as possible before restrictions are imposed is likely to add to the confusion in which the steel industry has been operating ever since the end of the last war.

Manufacturers looking for government contracts are coming to Washington in droves. Inquiries reaching the central procurement information office at the Pentagon have increased 500 per cent since the Korean invasion, and the Munitions Board has been forced to issue a formal request to contract seekers not to rush to the capital until plans have been matured and contracts can be talked about in definite terms.

Other manufacturers are besieging the Commerce Department in the hope of getting advance dope on how steel allocations will be administered, and are being paid off in generalities, since department officials themselves don't yet know what they will have to do.

Synthetics Speculation

Congressional debate on the Defense Production Act has developed that it will confer no authority for the Government to go into the business of producing oil or manufacturing synthetic liquid fuels or any other commodity, but observers in Washington see no bar to government financing of facilities for the production of synthetic fuels.

The Government could make loans to private business enterprises "for the expansion of capacity, the development of technological processes, or the production of essential materials," and at the same time could make provision for purchases of or commitments to purchase "metals, minerals, and other raw materials, including liquid fuels, for government use or for resale."

Actually, of course, any discussion of what the Government might do under the bill in this respect is purely theoretical for two reasons: At present there is an adequate reserve producing capacity and no indications that it will not continue to be adequate for considerable time, and the bill itself will be limited to a life of probably 1 and in no event more than 2 years.

The possibility of government encouragement of a synthetic-fuels industry would come in the event we became engaged in a general war which would cut deeply into our resources and necessitate extension of the act.

now provided by the renegotiation act.

As in the case of oil, the determination of cost of natural gas would be a "staggering" administrative task, he continued, and during the war Undersecretary of War Robert C. Patterson made statements to that effect in discussing the matter with congressional committees.

New Leasing Rules

Give future interest in acquired federal lands

WASHINGTON. — New regulations governing future or fractional interest in acquired lands were announced last week by the Interior Department. A 30-day period has been provided for the filing of any objections, and unless necessity for modification is shown the regulations will become effective next month.

A lease of a future or fractional interest in oil and gas deposits will be issued as a noncompetitive lease only on land not in a known geological structure of a producing oil or gas field, and the proposed regulations provide for execution of a supplemental agreement (Form 4-1155) which will require a present payment of royalty to the Government based on the period of time elapsing before the Government acquires the land.

Provision is also made for the payment of a rental of 25 cents per acre for each year prior to the effective date of a future-interest lease until production is had. When the property is producing, an overriding royalty will be payable to the Government.

The regulations will provide that the holding of the right to extract mineral deposits cannot be separated by assignment from the right to hold a future lease issued by the department.

Furthers development. — Issuance of future-interest leases furthers resource development, the department said in announcing the regulations. If the Government were not to issue such leases the holder under the present interest would know that at the end of a specified period of time either he would not be able to continue operations or he would have to bid competitively on the lease to be issued by the Government at that time.

"Such a situation would either retard development of oil deposits or cause operations to be conducted on a wasteful basis," it was explained. "Either the operator would refrain from drilling because he had no assurance that he can stay there until he had removed all the oil or else he would try to extract as much oil as possible in the shortest possible time. By issuing future-interest leases on the present basis, the operator is assured of his right to continue."

XUM

Tidelands Friction

Proposal for "interim" regulation brings protests from industry and states, endorsement from Interior official

WASHINGTON.—Charges that the Interior Department is attempting to secure an advantage in the offshore oil fields were loosed this week by state officials at Senate interior affairs committee hearings on legislation aimed at spurring to greater speed lagging development of marginal belt resources.

The department, it was asserted by Texas Atty. Gen. Price Daniel, would secure this advantage under the O'Mahoney resolution for interim operation of the tidelands which the Wyoming senator had presented as preserving the "status quo" pending final settlement of the basic issue of ownership *(The Oil and Gas Journal, July 26, page 157).*

Daniel, about to leave for Denmark, presented his argument after Mastin G. White, Interior Department solicitor, explained that the department's formal report on the O'Mahoney resolution had not yet been finally cleared but that, when submitted, it would express a need for federal legislation.

Called desirable.—"It is the view of the Secretary of the Interior that legislation along the general lines of the resolution is very desirable to clarify the situation and stabilize present operations and to permit during this interim period further exploration and development," White said.

White said that last year, in peacetime, demand exceeded domestic production by some 2,369,000 bbl. daily and that "it is only reasonable to assume that demand for 1950 and next year will be even greater."

Production from the submerged lands is a very important factor, he added, saying that it is running at the rate of 1,200,000 bbl. monthly in California and 250,000 bbl. monthly in the Gulf.

Under questioning by the committee, White said that development is lagging because of the uncertainty of lessees and uncertainty of the Government of the authority to issue additional leases. He said the department still believes the Mineral Leasing Act of 1920 cannot apply to the tidelands, citing Justice Department interpretations running back as far as 1924 which hold its application is restricted to the public domain and such other lands as Congress may specify.

Complete change.—Daniel told the committee the resolution does not preserve the status quo but, on the contrary, "provides for a complete change of management for an interim period with the inevitable delay that will result from the acquisition and training of personnel and the establishment of bureaus, rules, and regulations, surveys and records."

He cited the report of the House and Senate judiciary committees in 1948 holding that state administration was efficient and more desirable than federal management and pointed out that the states have been able to get far more in revenue from their activities than the federal Government would under its schedules of rentals and royalties.

"It has, however, become apparent that the Department of the Interior would be willing to stop all operations on the submerged lands in order to gain control of this property," Daniel declared, citing a recent directive to the Army Engineers to issue no permits to drill or expand locations on submerged lands without Interior Department approval and referring to reports that Sec. Oscar L. Chapman "is contemplating the leasing of tidelands under purported 'inherent powers' so that he may bypass the wishes of Congress and take control of this land."

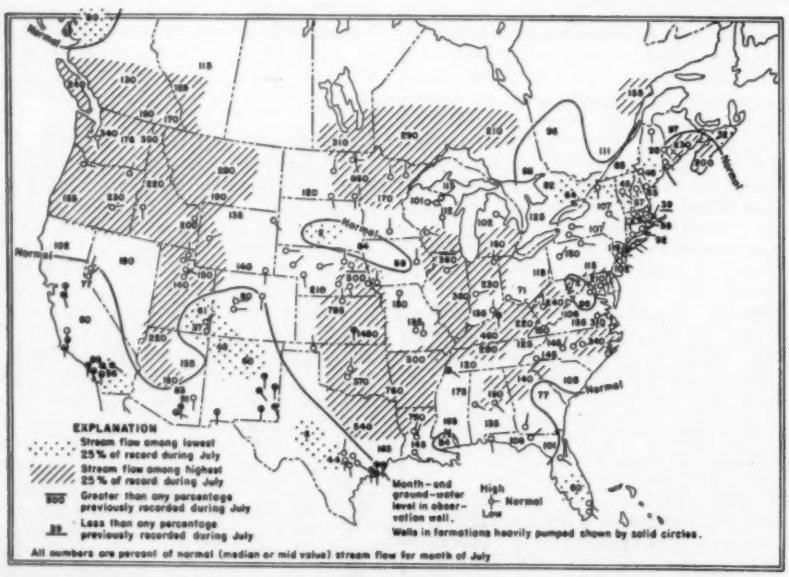
If it is to be enacted, he said, the resolution should be rewritten to embody in general the interim plan now being followed in California, under which the state continues to administer the submerged oil fields.

Other views.—Oil-industry views were submitted by Walter S. Hallanan, president of Plymouth Oil Co. and a member of the offshore lessees committee, and Rex G. Baker, general counsel of Humble Oil & Refining Co.

Hallanan expressed approval of legislation to permit continued operations since, he said, while experience in the Gulf so far has been disappointing, its possibilities have been barely scratched. There has been a serious decline in offshore operations because of the uncertainty of lessees of their final status, he explained, which could be eliminated by legislation but the O'Mahoney bill would have to be amended in some respects to be satisfactory to the industry.

Baker went into more detail regarding the changes needed in the legislation, disclosing that the major requisite would be full and complete validation of lessees' rights under state leases heretofore acquired in good faith. His testimony indicated that oil operators are not satisfied with mere assurances by the attorney general that their rights will be respected and will be content with nothing less than a legislative commitment. Further, he said, the objective of the measure can be accomplished only by adopting a leasing policy for the interim period corresponding with that previously successfully used by the coastal states.

Protest filed.—Meanwhile, in Louisiana, the state mineral board lodged a formal protest against what it termed obstruction by the Department of Interior. A resolution asked the state's representatives in Congress to oppose a joint resolution pending in the Senate providing authority for the Department of In-


EXPLANATION
Stream flow among lowest 25% of record during July
Stream flow among highest 25% of record during July
Greater than any percentage previously recorded during July
Less than any percentage previously recorded during July
Month-end ground-water level in observation well.
High
Normal
Low
Wells in formations heavily pumped shown by solid circles.
All numbers are percent of normal (median or mid value) stream flow for month of July

***WATER PATTERN.**—Abnormal rainfall in some areas, unexpected drought in others, affect many oil-industry activities, such as pipe-line construction, waste disposal, and supplies of cooling and process water. The Water Resources Review, a monthly service of the U. S. Geological Survey, shows what happened in July.*

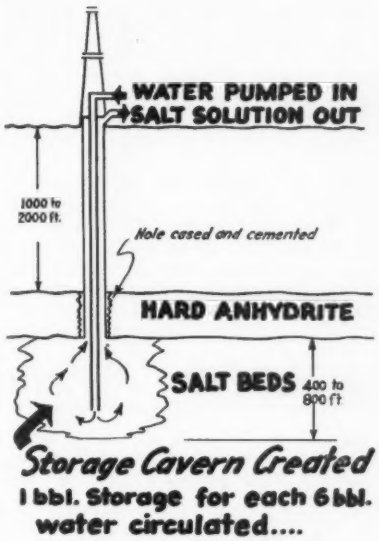
terior to administer tidelands oil property.

Charges are made that the department is "obstructing operations for the drilling and development of oil, gas, and other mineral deposits in submerged lands under navigable waters, both those involved and those not involved in the case of the United States vs. Louisiana, with arbitrary determinations being made by the department on each permit as to whether or not the land in question is affected by the said pending lawsuit; the department thereby doing indirectly that which it has no visible right or authority to do directly."

Autocratic manner. — The resolution said also that "the department is thereby furnishing a sample of what may be expected in the future, acting in an autocratic manner without even the courtesy of notification, much less prior consultation, with this board and the attorney general of Louisiana."

The board further asserted that the distinction between inland and outside waters was left vague, and that operation on inland waters would be hindered "unless and until the lessee from the state can obtain a clearance of title from the Secretary of Interior, who is invested by the joint resolution with arbitrary power to grant or refuse such clearance, without reference to the rights and needs of the state and its citizens."

Commenting in Texas, Bascom Giles, commissioner of the General Land Office, questioned whether the Department of Interior has authority to halt oil-well structures in the tidelands. "I don't think there is any provision in the law," he said, "but on the other hand there's probably nothing that would prevent it if the Corps of Engineers wants to cooperate."



Diagrammatic sketch of how the reservoir was made.

TECHNOLOGY

Man-Made Reservoir

Underground storage carved from salt bed by fresh water successfully stores propane in first commercial trial

KERMIT, Tex.—A public demonstration of the first man-made underground storage reservoir for propane and butane will be held at the Sid Richardson gasoline plant in Keystone field, 9 miles north of here, August 18 and 19.

The project was engineered by Hydrocarbon Storage Co., Inc., of Kermit, and this first commercial application of the idea has been tested successfully by the Sid Richardson plant.

The underground storage reservoir was carved out of a salt bed by injection of fresh water from the surface. In two tests propane was stored and completely recovered with no contamination except a slight trace of moisture.

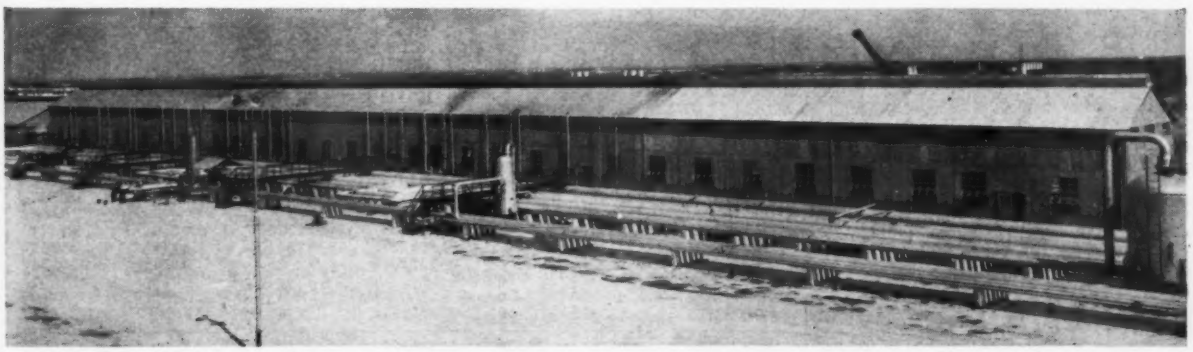
Blanket salt beds suitable for underground gas storage are said to be found widely throughout the Southwest and Mid-Continent regions. In the Permian basin they range from 1,000 to 2,000 ft. below the surface and are usually 400 to 800 ft. thick, with some salt-saturated shale breaks scattered through the beds.

In Keystone field, inspection of oil-well logs led to selection of a site near the gasoline plant, and a well was drilled to within 100 ft. of the bottom of the salt. Fresh-water casing was set and cemented, and the casing string cemented in the hard anhydrite just over the salt.

A string of 2½-in. tubing was run to 50 ft. off bottom, and fresh water was circulated with a portable pumping unit. Most of the circulation was down the tubing and the saturated salt water was removed through the casing into pits prepared for the purpose. Occasionally the circulation was reversed in order to remove small particles of salt and shale that fell to the bottom. It was found that 1 bbl. of storage capacity was created for every 6 bbl. of fresh water circulated.

When 7,500 bbl. of storage capacity was created the circulation was shut down for a commercial test. In the first test 1,500 bbl. of specification propane was pumped into the casing and the water was displaced from the bottom through the tubing. At the rate of 300 bbl. per hour an initial casing-head pressure of 430 psi. was required, which would gradually increase as propane displaced water in the reservoir.

Later the propane was forced back into the gasoline plant's steel tanks by pumping water into the bottom of the reservoir through the tubing. When returning propane at 300 bbl.



The Sid Richardson Keystone natural-gasoline plant which successfully stored propane in an artificial salt cavity.

XUM

per hour, 400 psi. of water pressure was required at the tubing head to overcome the friction loss in the 1 mile of 4-in. connecting line and the tank pressure of 175 psi. At a rate of 100 bbl. per hour the displacement water could be gravitated into the well.

In the first test 96.5 per cent of the stored propane was returned, while the second test brought a recovery of 99 per cent. In each case the usual laboratory tests found no contamination other than a slight trace of moisture.

The company says that this 7,500-bbl. storage reservoir was created at a cost of less than $2.50 per barrel, compared with about $15 per barrel for steel tankage, and estimates that in other areas storage can be created at somewhat similar costs per barrel, depending on the size and character of the formation being dissolved. While a salt bed is the ideal formation, it says, the process can be used in practically any type of underground formation that lends itself to solution or leaching by ordinary solvents.

INDUSTRY AFFAIRS

Stripper-Well Report

Compact Commission's 1949 survey shows that 13 per cent of nation's production came from stripper-well fields

OKLAHOMA CITY.—Stripper-well fields in the United States totaled 2,270,193 productive acres as of January 1, 1950, according to the annual report of the Interstate Oil Compact Commission, compiled in cooperation with the National Stripper Well Association.

The report stated that annual production of crude oil from stripper-well fields during 1949 totaled 258,396,753 bbl. This represents 13.75 per cent of the annual production of crude oil and condensate in the nation for that year. Daily average production may be generalized at 2.8 bbl. per well although this figure fluctuates widely from state to state.

Combined reserves from stripper-well fields were reported at 5.9 billion barrels as of January 1, 1950, of which 2.8 billion barrels were from primary reserves and the remainder of 3.1 billion barrels from areas which may show secondary-recovery possibilities.

Ranking states.—In number of stripper wells, Pennsylvania continued to lead the nation. The 79,615 wells reported for that state represented 31.2 per cent of the national total. In this classification, Oklahoma ranked second with 43,602 stripper wells for 17.2 per cent of the United States total.

On the basis of productive acreage, Pennsylvania led with 625,193 acres, or 27.6 per cent of the national total. Kansas was in second position with 311,784 acres to account for 13.7 per cent.

However, from the standpoint of accumulated production from stripper fields, Oklahoma led the nation. To January 1, 1950, Oklahoma produced 3.9 billion barrels from stripper-well fields for 27.4 per cent of the national total. California, in second position, yielded 3.6 billion barrels, or 25.1 per cent.

Using annual production in 1949 as a yardstick, Illinois ranked first with 56.3 million barrels of oil from stripper-well fields, California was second with 55.4 million barrels, and Oklahoma third with 44.1 million barrels.

Since 1942.—The Compact Commission has collected statistical data on stripper wells since 1942 when the price of crude oil fixed by the Office of Price Administration offered an economic threat to the continued operation of stripper wells in many of the nation's oil fields. As a result of the commission's analyses, a subsidy price was set for stripper-well production during the war period.

In the preparation of these surveys, a stripper well was defined by the commission as "a well whose production expenses approximate income," a classification which allows an uneconomic deep well with a relatively high daily oil rate to be rated as a stripper well.

The commission's report is presented in an accompanying table.

Tax Halts Superior Split

LOS ANGELES.—Tax study has caused Superior Oil Co. of California to postpone indefinitely its proposed reorganization into two separate com-

NATIONAL STRIPPER-WELL SURVEY—JANUARY 1, 1950

State—	Number of stripper wells, 1949	Production in barrels from stripper-well fields 1949	Productive acres in stripper-well fields	1949 abandonments	Thousands of barrels: Accumulative production from stripper-well fields to 1-1-50	Thousands of barrels: Estimated primary reserves in stripper-well fields, 1-1-50	Thousands of barrels: Estimated probable secondary recovery reserves in stripper-well fields, 1-1-50	Thousands of barrels: Estimated total reserves in stripper-well fields, 1-1-50
Arkansas	2,396	5,817,310	55,724	16	554,144	76,706	64,825	141,531
California	15,249	55,441,000	108,018	56	3,555,684	699,338	871,660	1,570,998
Colorado	132	527,422	10,400	0	27,719	1,151	.....	1,151
Illinois	5,293	56,290,000	252,690	321	938,192	391,216	.....	391,216
Indiana*	495	369,396	11,416	19	8,978	.....	.....	.....
Kansas*	17,070	24,729,879	311,784	0	1,123,880	279,367	238,404	517,771
Kentucky*	14,700	3,285,000	71,000	250	40,000	50,000	25,000	75,000
Louisiana	4,070	8,793,975	32,264	266	.....	.....	.....	.....
Michigan*	.....	.....	.....	0	.....	.....	.....	.....
Mississippi	71	259,150	2,840	10	143,524	40,000	.....	40,000
Missouri	99	32,028	1,000	0	.....	.....	.....	.....
Montana	2,914	4,609,275	63,875	28	133,743	37,980	7,295	45,275
Nebraska	54	120,746	2,440	0	5,675	805	.....	805
New Mexico	2,117	4,003,471	79,556	14	‡110,135	383,513	63,985	447,498
New York	23,250	4,401,000	71,000	290	172,891	13,859	63,250	77,109
Ohio	20,034	3,845,000	154,000	1,456	618,000	27,542	10,000	37,542
Oklahoma*	43,602	44,182,000	260,000	1,041	3,863,776	387,500	1,000,000	1,387,500
Pennsylvania	79,615	11,569,159	625,193	4,923	1,134,439	40,297	412,018	452,315
Tennessee	27	18,000	185	5	730	.....	.....	.....
Texas	20,959	20,471,755	99,461	1,389	1,186,958	159,968	307,350	467,318
North Texas	15,625	16,230,820	78,125	483	1,029,737	117,187	234,375	351,562
West Central Texas	5,334	4,240,935	21,336	906	157,221	42,781	72,975	115,756
Texas, other*	.....	.....	.....	0	.....	.....	.....	.....
West Virginia†	.....	.....	.....	0	.....	.....	.....	.....
Wyoming	3,009	9,631,187	57,347	40	521,395	165,266	39,250	204,516
Total*	255,156	258,396,753	2,270,193	10,124	14,139,863	2,754,508	3,103,037	5,857,545

*Incomplete. Subject to revision. †No data available 8-1-50. ‡Production from stripper wells only.

panies. One of the companies was to own and operate gas reserves and plants and the other the oil and varied properties.

The two new companies had been organized and the Treasury Department had issued a ruling and closing agreements to the effect that the proposed reorganization would not result in recognizable gain or loss for federal income-tax purposes to the company or the stockholders.

Tax counsel then advised the company that recent world-wide developments make the enactment of an excess-profits tax on corporate earnings virtually a certainty. An excess-profits-tax law similar to that which existed during World War II was considered a potential burden which might materially endanger the ability of the gas company to meet its financial obligations.

New Products Line

Plantation to use 14, 18-in. on new carrier

ATLANTA.—The first use of pipe larger than 12 in. in diameter on a petroleum-products line has been announced by Plantation Pipe Line Co. here. The firm will use 14 and 18-in. pipe in constructing a 707-mile line paralleling its present system, C. R. Younts, president, reported.

The new line will run from Baton Rouge to Charlotte, N. C., and 18-in. pipe will be used on a 432-mile section between Baton Rouge and Bremen, Ga., and the 14-in. will be used for the 275-mile section running from Bremen to Charlotte.

The expansion will be financed by $40,000,000 20-year sinking-fund debentures and $12,000,000 by loans from several banks. Debentures will be sold through public offering underwritten by a group headed by Morgan Stanley & Co.

In addition to the line, new pumping units will be added to replace existing stations. The system's capacity will be stepped up from the present 95,000 bbl. daily to approximately 167,000 bbl. daily.

Existing line.—Plantation's present line has actually been pumping 100,000 bbl. of products daily. It was built in 1941-42, with stations located at 60-mile intervals. Temporary intermediate stations were built during the war, which resulted in an ultimate station spacing of 30 miles. These have continued in operation. Under the new plan, operation of these intermediate stations will be discontinued, and the new stations to be installed will be spaced at 120-mile intervals. A later increase in pumping facilities might raise throughput of the new system to 221,000 bbl. daily.

Contract for construction to be carried on in 1951 will be let within 45 days, the company said. Some preliminary work is now under way at river crossings.

National Tube Co. will roll the 432 miles of 18-in. and several English companies will furnish 20,000 tons of 14-in. Balance of the 14-in. will be furnished by Jones & Laughlin Steel Corp. in the latter part of 1952.

Imports Increase

June figures also show rise in export of oil

PETROLEUM imports during June were 6 per cent higher than in May, but at the same time exports increased 1.1 per cent, according to data of the Department of Commerce.

Imports of crude and products into continental United States averaged 823,000 bbl. daily, compared with 773,000 bbl. daily in May and 634,000 bbl. daily in June of last year.

The gain in crude imports over the previous month was due to increased receipts from Venezuela. However, imports of Venezuelan crude in May were less, on a daily average basis, than in any month since August 1949. June receipts from Mexico, Colombia, and Saudi Arabia were less than in May.

Product imports gained 23,000 bbl. daily over May, with most of the increase credited to asphalt and unfinished oils.

Crude exports in June were at the highest level since August 1949, but gasoline shipments were off again after the better-than-average report for May.

The outstanding export increase in June was for residual fuel, with a total of 1,398,000 bbl. compared with 861,000 bbl. in May and 608,000 bbl. in June of last year. These export totals do not include shipments to territories.

IMPORTS INTO CONTINENTAL UNITED STATES
(Thousands of barrels)

	June 1950	May 1950	June 1949
Crude—			
Mexico	222	912	826
Colombia	1,314	1,646	1,031
Venezuela	9,365	7,928	8,116
Kuwait	2,322	2,226	1,964
Saudi Arabia	985	1,126	1,155
Total crude	14,208	13,838	13,092
Daily average	473	446	436
Products—			
Residual fuel	9,336	9,342	5,385
Other products	1,160	793	541
Total products	10,496	10,135	5,926
Daily average	350	327	198
Total all oils	24,704	23,973	19,018
Daily average	823	773	634

EXPORTS*
(Thousands of barrels)

	June 1950	May 1950	June 1949
Crude	3,226	2,946	3,071
Gasoline	1,422	1,844	3,196
Distillate	454	691	656
Residual fuel	1,398	861	608
Lube oils	910	1,160	897
Other products	501	583	562
Total all oils	7,911	8,085	8,990
Daily average	264	261	300

*Excludes shipments to territories.

***RED-HOT RESEARCH.**—This combustor, or gas turbine, is being tested at the new jet-propulsion laboratory at The Texas Co.'s research center, Beacon, N. Y. Exhaust gases from the turbine, traveling at speeds of 1,000 ft. per second, reach temperatures of 1,600° F. and turn the exhaust pipe a brilliant cherry red. The Texas Co. jet lab is believed to be the first large industrial installation of its kind to be financed entirely from private funds. Engine operation at altitudes up to 60,000 ft. may be simulated, and a simplified automatic control system permits one operator to conduct combustion-efficiency tests over a wide range of temperature and pressure conditions. The new lab is being used to test not only petroleum-derived fuels but organic and inorganic chemicals which offer power possibilities.*

XUM

Gas Lines and Gardens

SoCal Gas Co. uses human relations to create good will out of disruptive job of pipe lining through city streets

D. H. Stormont

LOS ANGELES.—How to lay a pipe line through a man's front yard and make him like it is a neat public-relations trick which has been accomplished with marked success by Southern California Gas Co.

It laid a 30-in. gas line through business and residential areas of two Los Angeles suburbs in a way that brought praises instead of squawks from the people who had to climb over open ditches and piles of dirt.

Laying a big line through a city is a disruptive job, at best. Pavement breakers, ditchers, tractors, and graders are noisy and dusty. A ditch 3 or 4 ft. wide and 5 to 12 ft. deep is a hazard to vehicles and pedestrians, and the pile of dirt beside it blocks traffic and interferes with the comings and goings of nearby residents.

Myriad legal obligations are involved, but beyond these are moral obligations which must be met if the company is to retain the good will of the people—customers, maybe—whose lives are temporarily disrupted.

Southern California Gas Co. reasoned that this problem called for a careful public-relations program coupled with detailed advance planning. It tried the plan on two jobs connected with bringing additional Texas natural gas to the Los Angeles area, and believes that the good will created is worth far more than the cost.

Careful planning.—The company's program begins at the time the job is first undertaken. It is considered in the selection of the gas line's route, in the acquisition of right-of-way, and throughout the line's construction.

Currently the company is engaged in adding an 80-mile loop, from Whitewater to Puente on the outskirts of Los Angeles, to its 30-in. gas line from West Texas and the Panhandle. Involved in the line's construction was the laying of 19,000 ft. of pipe through the streets of Riverside and 11,000 ft. through Banning. The former is a city of 50,000 population and Banning has 7,500.

No complaints.—Work on public right-of-way in both cities has been completed. In Banning the job was done without a single complaint. In Riverside the only criticism was during the few days when an unsolvable dust problem arose. The company provides natural gas to both cities, and all persons affected were its customers.

The job-site phase of the program was handled by an experienced public-relations man, Don U. Wheaton. He acted as liaison agent between the affected public and company inspectors, who then conferred with the contractor's representatives. He settled certain inconvenience claims on the spot, referring all major claims to the land and right-of-way department, and in general acted as a good-will agent.

Briefly summarized, his job included: (1) In advance of construction, contacting all persons residing or operating a business along the pipe-line route. (2) Notification to police and fire departments of date when work would begin. (3) Acting as liaison between pipe liners and residents while the work was inconveniencing the latter's activities. (4) Keeping city officials informed of the rate of progress. (5) Doing a myriad of other things not

This unusual account of how a gas company turned a liability into an asset was prepared by the Journal's West Coast editor.

It is a fine example of public relations in action, and illustrates a growing trend among oil and gas companies to get away from the old "public-be-damned" attitude of some utilities. Southern California Gas Co. was faced with the unpleasant prospect of inconveniencing and irritating its customers while laying a pipe line through city streets, but by careful planning and fast footwork it won their good will instead.

Proof of success came in Riverside only a few days after the delicate job was completed there. A local sewer contractor kept a nearby street torn up for many days, with the ditch open, traffic closed off, and dirt piled high on lawns and driveways. Irate citizens deluged the mayor's office with complaints, and the mayor's secretary was quoted in the local press as saying:

"They can't see why the sewer contractor can't do as neat a job as Southern California Gas Co. did when it laid its big pipe line through the city."

These two photos, taken 48 hours apart at the same spot in Banning, show how rapidly Southern California Gas Co. laid its 30-in. line through city streets. At the left, pipe is being lowered in immediately behind the ditching machine. At the right, 2 days later, the ditch has been filled, extra dirt and rocks are being hauled away, and the street is ready for restoration of the pavement.

capable of being classified but all of which made for better public relations.

Door-to-door.—Directly in advance of the construction crews, Wheaton visited each house and business along the route. After plainly stating that the next few days would be dirty and noisy, and that routine activities would be upset, he obtained data concerning their daily traffic. This included the number of members and their ages; how many persons worked; what time they left for and returned from work or school; whether there was a car; and the time of day the housewife did her shopping. With these facts and other pertinent data, Wheaton noted the attitude of the person interviewed.

If children were in the household, he was careful to point out safety hazards and to solicit cooperation in keeping them at safe distances during construction — principally after the crews had gone for the day.

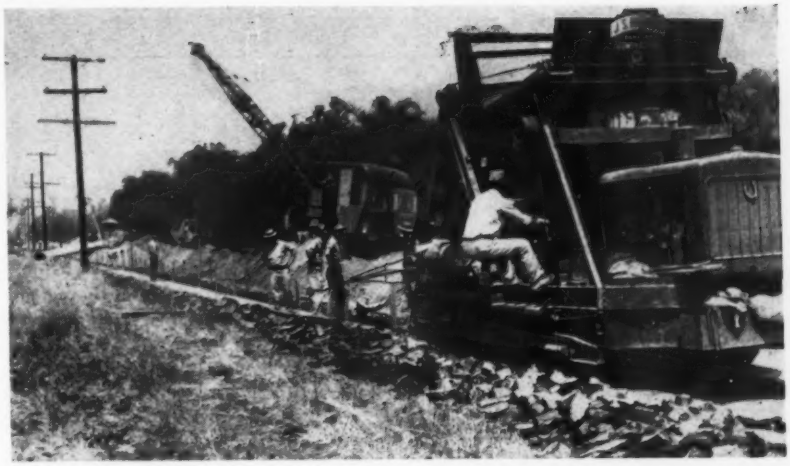
If the husband was a medical doctor, or had other civic or professional duties which placed him on call 24 hours a day, every effort was made to make this possible. If the housewife wished to go shopping while work was under way in front of her home, she was told that a couple of hours of advance notice to the company inspector on the job would result in the street being clear.

Taxis provided.—Where daily use of an automobile was required, the people were told that if temporary parking with some neighbor off the affected street could be arranged, Southern California would reimburse them for any nominal storage charges. They also were told that such would be the case if the construction activity should cause them to use a taxi.

By taking them into confidence and by forewarning—the latter just sufficiently in advance that they would not have time to forget—most residents reciprocated with gratifying cooperation.

Also to build up public acceptance, Wheaton worked closely with city authorities. If mail was being delivered by automobile to boxes placed just off the street, he arranged for all boxes to be grouped on a side street not affected by construction. Likewise, after the street was cleared he saw that the boxes were properly replaced. Since city officials usually are the first to hear any complaints, he also called upon the mayor and police and fire chiefs to acquaint them with construction plans.

Maintaining good will.—While work was under way in both Riverside and Banning, Wheaton patrolled the job site frequently. Any requests a housewife might make as to getting her car out, he quickly passed on to the company inspector. He made it a point to answer questions of children—and grown-ups—as to what was going on, thereby making them "pipe-line experts" in their later conversations with the uninformed. Also he was constantly checking to see that all claims—whether moral or legal—were at least being given proper and quick consideration. Before work was stopped every afternoon, he checked to make certain that a bridge was placed, or the ditch backfilled, before the driveway of anyone wishing to have the car out that night.



While working in residential areas, spreads were concentrated to the greatest extent possible. On this street in Riverside the pipe-laying crew is only about 50 yards behind the ditching machine.

At Banning the construction activity, which could have been a liability to company good will, actually was converted into favorable publicity. While Wheaton was visiting public schools to obtain classroom support in keeping children at safe distances from construction activity, one group expressed a desire to learn more about pipe lining. The result was a father-and-son gathering, with more than 200 in attendance, at which the company movie on the building of the Texas - California line, "Westward Flow," was shown. After the movie he spent 45 minutes answering questions on pipe lining in general and on the local project.

Also while construction was progressing, numerous other activities were carried on to promote good will. The police and fire departments were kept informed of the rate of progress, and where and when traffic police would be needed. When an unavoidable dust problem arose in Riverside, where lack of curbing prevented the usual practice of washing the street after the ditch had been backfilled, sprinklers were used until the dust could be removed by sweepers.

This consideration involved extremely close cooperation on the part of the contractor, Midwestern Constructors, Inc., of Tulsa. Close planning of work also was required so that the job could proceed as quickly as possible yet with minimum disruption of neighborhood activities. Scheduling of work in crossing street intersections was given much thought. If it was too late in the day to run the ditch completely across the intersection, and then either backfill or bridge a crossing, ditching progress would be suspended until the following morning.

Gardens replanted. — Clean-up crews also made many friends for the gas company by restoring all parkings, concrete and gravel driveways, sidewalks, and any ornamental improvements to their former condition. Flowers which had been trampled or uprooted at the outer edges of gardens were replaced. Pains were taken to make the site appear as it had before construction, if not better.

Southern California Gas has long been alert to good public relations in repairing or expanding its distribution systems. The enlarged program was undertaken to relieve the company inspectors of this extracurricular, time-consuming job, leaving them free to carry out their principal duty of seeing that the lines are properly laid.

The program was first applied late last year when the company expanded its main-line distribution system from the eastern to the southwestern outskirts of Los Angeles. The great majority of this work was done along city streets in heavily populated areas.

The company cannot place a dollars-and-cents figure on the value of this program. The many voluntary letters of commendation received, and the voiced "thanks" of numerous customers for the consideration shown them, can be classed only as intangible results. The same is more or less true of the good will created with city officials in Banning, Riverside, and in the southern Los Angeles suburbs where the earlier work was done. Company officials, however, consider them worth while to justify the thought and minor expense.

XUM

WEST COAST

New Cuyama Outlet

Richfield Oil Corp. will soon complete final leg of new trunk line to move Cuyama field crude to refineries

D. H. Stormont

LOS ANGELES.—To care for growing crude-oil production in the Cuyama Valley, Richfield Oil Corp. within the next few months will complete the final leg of a new trunk line between the Cuyama fields and refining and shipping facilities at Los Angeles Harbor. The new line, the major portion of which is 14-in. with a daily capacity of 75,000 bbl., more or less parallels the company's existing line from San Joaquin Valley fields.

When Cuyama Valley's first oil field, Russell Ranch, was discovered by Richfield in June 1947, the severe steel shortage caused the company to lay a 30-mile invasion pipe line to its Santiago field station (see map). This 6-in. line was replaced with an 8⅝-in. line in April 1949.

Discovery of South Cuyama field in May 1949 soon rendered these facilities inadequate. Accordingly, late last year Richfield started enlarging its carrier system from Cuyama to its Watson refinery as shown on the sketch map. In February the approximately 80-mile section of 14-in. line from the refinery to its Newhall station was completed. About 1 month later a new 40-mile, 10-in. line was placed in operation between the South Cuyama station and the Wheeler main-line station, eliminating the roundabout haul through the Santiago and Lake stations.

Two new stations.—Final leg, contract for which is soon to be let, is the laying of about 35 miles of 14-in. pipe between the Wheeler and Newhall stations. Also two new stations will be erected, one at Newhall and a second at an intermediate point. Capacity of the 14-in. line will be 73,000 bbl. daily.

Richfield's lines are the sole pipeline outlet for Cuyama Valley, which now has four fields with a fifth assured. Russell Ranch, with 135 producers and a daily production of around 21,500 bbl., is now practically drilled up. Last year's discovery, South Cuyama, now has 130 producers and a daily output of 23,000 bbl. It is believed to be less than 50 per cent developed. This year's two discoveries, in the mountains adjacent to northwestern Cuyama Valley, are the two-well Superior pool and the nine-well Clayton pool of Morales field.

Current production from the valley fields' 275 producers is around 46,000 bbl. daily, and is steadily climbing. Richfield's participation in this activity is to the extent of about 36,000 bbl. daily from 215 producers.

SOUTHWEST

Panhandle Gas Prices

AUSTIN.—The weighted average market price currently being paid at the well head for sweet gas produced in Panhandle field is 3.9083 cents per thousand cubic feet, measured at a base pressure of 14.65 psi. and 60° F., the Railroad Commission of Texas announced this week on the basis of hearings held in May. Texas law permits this figure to be used as the market price for gas contracts.

The commission said that the weighted average price paid for sweet gas at the well head under contracts entered into during the years 1948, 1949, and the first 4 months of 1950 was 5.5406 cents per thousand cubic feet, measured at standard conditions. This does not consider other gas being sold at the well head in the field at this time under older contracts.

The weighted average market price being paid at the well head for sour gas produced in the Panhandle field is 3.4083 cents per thousand cubic feet, measured at standard conditions, the commission stated.

The next regular meeting on the market price for Panhandle gas will be held on November 9, 1950, at the Herring Hotel in Amarillo, Tex., it was announced.

Texaco Refinery Purchased

TULSA.—The Texas Co.'s 21,000-bbl. refinery at West Dallas, shut down since October 1949, has been purchased by two Tulsa oil-field equipment firms for a consideration of approximately $750,000.

Mid-States Pipe & Supply Co., and Rogers & Wright, Inc., bought the

It's no time to fiddle!

HEADLINES warn us of the menace of spies and subversive agents. But in every community there is a hazard, largely unrecognized, which may become ready tinder for the ravaging flames of socialism and communism. This is the misconception of everyday economic facts that exist among our young people.

For example, a recent poll among high school seniors shows that the majority of them believe that the owners of business take out for themselves a larger share of the income than is paid to employees. They think the stockholders' average return is 24% of the sales dollar. The truth is that stockholders average less than 3%, whereas over 30% of the income dollar is paid out as wages, pensions and other benefits.

Our young people do not seem to realize that paying dividends is only one function of profits. Far more important today is the need for profit to keep business competitive, and to pay for new buildings, machinery, and other necessary equipment and to provide new and more jobs. Ignorance of this fundamental concept breeds contempt for the system of enterprise that built our country and keeps it strong.

The facts of business must be given to our boys and girls to protect their future. Only business men can supply the facts. As a business leader in your community, it is your responsibility to help clear up such misconceptions. The old story that Nero fiddled while Rome burned must not have a counterpart in America.

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XUM

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RYERSON STEEL

plant for the purpose of salvaging its facilities. However, in view of the war situation, the firms are now negotiating for the possible sale of the entire properties.

A spokesman for the supply firms said that a deal is now under consideration whereby the refinery would be sold to a South American firm, dismantled and shipped to that continent, and reassembled.

Originally constructed in 1917, the refinery was completely modernized from 1933-38, when four Kellogg thermal cracking units were installed. These have a capacity of 9,000 bbl. daily.

The transaction included the entire refinery operating units, together with all processing equipment, pipe lines, a tank farm with a storage capacity of approximately 1,500,000 bbl., pump houses, buildings, and warehouse inventories. Also included in the purchase was all real estate, which approximates 450 acres.

Mid-States and Rogers & Wright said that other negotiations are pending for the lease of the tank-farm facilities for oil-storage purposes.

MEETINGS

A.A.P.G. Meets Next Month

BANFF, Alta.—The oil and gas fields of Alberta, including recently discovered Devonian reef fields, will be described at the regional meeting of the American Association of Petroleum Geologists, to be held here September 5-8.

The Alberta Society of Petroleum Geologists will be hosts of the conference, to be held jointly with the Society of Exploration Geophysicists and the Geological Association of Canada. All meetings are to be held at the Banff Springs Hotel.

Structure and stratigraphy of the Rocky Mountains, foothill belt, and the plains, will be discussed during the 4-day program. Papers will be presented on the western Canada sedimentary basin, the Northwest Territories, the tectonic map of Canada, the geologic history of the plains, and the Athabaska tar sands. Field trips are planned for the Banff area as well as across the front ranges of the Rockies and a portion of the foothill belt.

A series of papers on reef theory will draw convention interest. T. A. Link will address the group on "Some Thoughts on Reef Trends and Configuration." P. S. Warren and C. R. Stelck will discuss "Stratigraphic Significance of Devonian Coral Reefs in Western Canada." W. W. Waring will speak on "Charles Darwin and Western Canadian Reefs," and A. W. Nauss will exhibit on "Regional Cross Section Through the Reef Fields of Central Alberta."

Case histories of Alberta reef fields will command prominent program attention. They include: "The Leduc and Golden Spike Reef Fields," by R. D. Sluzar; "Progress and Development of the Leduc Oil Field Since 1948;" "The Redwater Reef Field," by W. P. Hancock and H. G. Gamble; and "The Stettler Field," by R. P. Lockwood and O. A. Erdman.

Marketers Plan Meeting

AUSTIN.—A state meeting of the Petroleum Marketers Association is tentatively scheduled here in September. The organization is composed of more than 2,500 wholesale distributors of petroleum products. Headquarters have been recently established here.

Ohio Group to Meet

COLUMBUS. — Representatives of the state's mineral industry will review its assets and evaluate its future at the Ohio Mineral Industries Conference, to be held here September 25-26.

The mounting international crisis is cited as a new factor in the need for such a conference, the first of its kind to be held in the state.

An important objective of the conference will be to acquaint the industry particularly with the research facilities available through Ohio State University, Battelle Memorial Institute, and similar organizations and services.

The principal speaker will be Donald H. McLaughlin, president of American Institute of Mining and Metallurgical Engineers.

W.P.R.A. Meeting Slated

ALMA, Mich. — Two papers on octane numbers will highlight the regional technical meeting of the Western Petroleum Refiners Association to be held on August 28, 1950, in the Leonard Refineries auditorium here, Reid Brazell, Leonard Refineries, Inc., meeting chairman, has announced.

R. V. Kerley, Detroit, associate director of research, Ethyl Research Laboratories, will address the group on "Observations on Mechanical Octane Numbers." Recent work on combustion-chamber design as a basis for creation of mechanical octane numbers will be described.

Dr. R. N. Giles, Chicago, director of technical research, Standard Oil Co., (Ind.), will discuss technical and economic aspects of future octane-number requirements.

Plan Corrosion Conference

HOUSTON.—Plans for the 1951 Conference and Exhibit of the National Association of Corrosion Engineers to be held at Hotel Statler, New York, March 13-16, 1951, were reviewed this week by L. B. Donovan, Consolidated Edison Co. of New York, Inc., general chairman.

Prof. Norman Hackerman of the University of Texas, Austin, chairman of the technical-program committee for the conference, has outlined arrangements for 39 papers.

Assisting Dr. Hackerman as cochairmen of the technical program are R. L. Bullock, Interstate Oil Pipe Line Co., Tulsa; G. W. Seagren, Mellon Institute, Pittsburgh; and Aaron Wachter, Shell Development Co., Emeryville, Calif.

T. S. Zajac, Shell Oil Co., Houston, has been named chairman of the oil and gas industry symposium. His cochairmen will be H. E. Waldrip, Gulf Oil Corp., Houston, and E. Q. Camp, Humble Oil & Refining Co., Baytown, Tex.

S. S. Smith, Shell Oil Co., New York, was named chairman of the pipe-line industry symposium. Cochairmen will be W. E. Huddleston, Huddleston Engineering Co., Bartlesville, Okla., and I. B. Tietze, Phillips Pipe Line Co., Bartlesville.

Other symposium topics cover chemical, transportation, protective coatings, cathodic protection, corrosion inhibitors, electrical, and communications.

NEXT WEEK

Report Week.—The Oil and Gas Journal will carry so many feature engineering articles in the next issue that the event might well be called "Report Week." Here is a quick takeoff, "report wise." **No. 1:** "Extensive Modernization and Construction Program by Socony-Vacuum at East St. Louis Refinery." **No. 2:** "Completion and Production Techniques in Unconsolidated Sands," by J. A. Perkins, Jr., assistant chief production engineer, Houston district, Gulf Oil Corp. **No. 3:** "Conditioning Water for Secondary Oil Recovery in Appalachian Fields," by J. N. Breston, laboratory director, Pennsylvania Grade Crude Oil Association. **No. 4:** "Water-Soluble Cutting Oils As Pickling Inhibitors," by K. F. Hager and M. Rosenthal. **No. 5:** "Relationships Between Electric-Log Resistivities and Fluid Contents of Porous Rocks," by Dr. Leendert de Witte, California Institute of Technology. **No. 6:** "New 15,000-Ft. Plus Service Rig Unveiled at Shreveport." **No. 7:** "Flange, Gasket, and Bolting Materials for Refinery Service." **No. 8:** "Fast Drilling—Humble Drills a Record 2,448 Ft. in 8-Hour Tour," by L. S. McCaslin, Jr., Gulf Coast district editor. **No. 9:** Weekly features on Refiner's Notebook, Engineering Fundamentals, Questions on Technology.

XUM

FAR EAST

Confusion in Burma

Reconstruction prospects of oil industry appear remote due to labor, war situation; financial troubles cited

PROSPECTS of reconstruction of the oil industry in Burma appear to have become more remote over the last year.

The continued discouraging outlook in this once-important Far Eastern producing and refining country was described by Sir Kenneth B. Harper, chairman and managing director of Burmah Oil Co., Ltd., at the company's recent annual general meeting in Glasgow, Scotland.

It is not possible to tell when or if it will again be possible to resume operations on the scale formerly contemplated, he said. Despite the fact Burmese Government forces have reoccupied some towns recently, the greater part of the country through which Burmah Oil's main pipe line to Rangoon runs is still outside of government control. Repair, much less operation, of the line cannot be undertaken under the circumstances.

"When and if order has again been restored and maintained long enough to give promise of being settled, the directors will assess the economic possibilities of the subsidiary companies' resuming operations in the light of the conditions then prevailing and their attractiveness as an investment," he said.

The company chairman revealed that the Burmese Government had been unsuccessful in its efforts to raise money to carry out its proposal that it finance part of the reconstruction of the industry. This plan was advanced last year after the three British oil companies in Burma had decided against further expenditure due to the disturbed conditions.

When this project broke down, Burmah Oil proceeded to discharge employes who had become surplus to its reduced operations. These discharges were contested by labor unions, and the awards made recently by the Industrial Court were unsatisfactory to the company and have been referred to the Supreme Court of Burma.

In order to assist the Burmese Government and give it time to negotiate a loan for money to help with the oil-industry reconstruction, the British Government underwrote expenditures incurred by the company after March 7, 1949. Burmah Oil plans to present its account to the British Government as soon as the full amount is known.

Pakistan.—In his discussion of the company's activities in India and Pakistan, the chairman referred to the breakdown of political relations between the two countries and said this had hampered normal distribution of petroleum products. Supplies from the Assam refinery in India normally pass through Pakistan to reach markets in India, and at the close of the year political conditions put a stop to all through traffic. Supplies had to be routed directly to the newly built Assam railroad and to the river, through traffic on which was fortunately quickly restored, he said.

Development of a small field is proceeding at Chakwal in the Punjab in Pakistan as a result of Burmah Oil's discovery in Chakwal 2. The results of the abandoned Lakhra well indicate large areas in Sind, Pakistan, must now be considered valueless for oil, but the company is continuing its exploration of other parts of the country. As for India, the Burmah Oil chairman said that extension drilling has proved a valuable addition to the productive area in that field.

MIDDLE EAST

Egypt Relaxes Feud

Three oil companies get new prospecting licenses

EGYPT broke its stalemate with foreign oil companies when the government granted three new prospecting licenses to British, American and French companies. This comes as the first rift in the 3-year feud that has blocked all new production activities. The Egyptian Chamber of Deputies authorized Mahmud Soliman Ghannam Bey, Minister of Commerce and Industry, to grant licenses to Anglo-Egyptian Oilfields, Ltd., Socony-Vacuum Oil Co., and the French Societe Generale des Huiles et de Petrole.

These companies are prepared to conduct their researches in the hope that, by the time they have advanced sufficiently to talk about the granting of leases, some avenue of action will have opened. In the opinion of some oil experts, the granting of the new licenses was in the nature of a "softener," designed to influence the eventual outcome of negotiations on the main issue.

Egypt has refused to grant leases to oil companies unless 51 per cent of the company's shares are offered to Egyptian nationals. In addition to royalties, Egypt also wants substantial quantities of all oil produced under any new leases at prices below those fixed in the world market.

Such demands have been rejected by the oil companies as excessive in amount and destructive in effect. Negotiations seeking some basis of compromise have been dragging along for months, neither side finding any common ground to which they might yield.

Reports from London indicate the British interests received the report of the new licensing without optimism. The long and heated struggle has given them no illusion as to Egyptian tenacity, but some hope is expressed that the changed world condition may have influenced Egypt in taking the licensing step.

Royalty Agreement

I.P.C. to increase rate to Iraq by 50 per cent

An agreement under which Iraq Petroleum Co., Ltd., will increase its royalty rate by 50 per cent has been reached between the company and the Iraq Government, according to an announcement in Bagdad.

The new rate will be 6 shillings, gold, per ton. Calculated on the official gold rate of $8.24 per gold sovereign, this royalty is the equivalent of approximately 33 cents per barrel. The former royalty rate was 4 shilling, gold, per ton.

The Iraq Government announcement indicated only partial settlement of the issues which have been under discussion between the company and the Government intermittently for nearly 2 years. The Government said it would sue the company to determine if the royalty payment would be based on the free market gold rate. This is now about $1.50 a gold sovereign (20 gold shillings per sovereign) in Middle East markets.

On its part the Iraq Government has agreed not to ask for modification of the royalty after July 14, 1954. This contract provides modification of the royalty rate each 10 years within the limits of 2 and 6 shillings, gold, and according to the past profit or loss of the company.

The agreement applies only to the Iraq Petroleum operation and negotiations are continuing regarding revision of the concession terms of the

XUM

At Sun Oil's Starr County Plant . . .

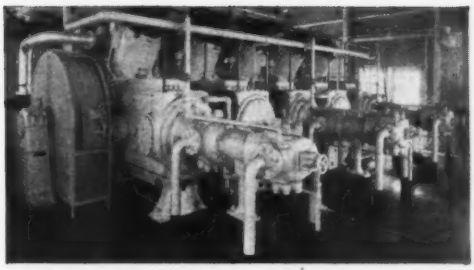
A 4-WAY JOB FOR MODERN COOPER-BESSEMERS

In this new natural gasoline plant, engineered by Petroleum Engineering, Inc., there's good evidence of how well, how efficiently Cooper-Bessemer units of various types meet today's needs in power, compressing and pumping.

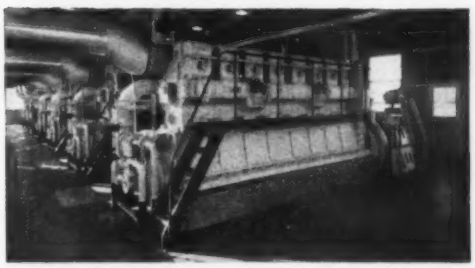
For in this one modern project, as shown here, you'll find Cooper-Bessemer in-line gas engines driving generators for all electric power requirements. And you'll find space-saving Cooper-Bessemer Twin-line pumps handling lean oil. These pumps in turn are direct-driven by compact Cooper-Bessemer GMX V-Type gas engines. Finally, last but not least, a 1,100 hp Cooper-Bessemer GMV Turboflow, tops today in compressor compactness and over-all economy, handles residue gas for return to a field reservoir.

To get at the reason *why* Cooper-Bessemers have been picked for all these services, you have only to weigh the important new developments introduced during recent years by one of America's *oldest* builders of engines and allied machinery.

Another Example of Efficient Power at Lower Cost



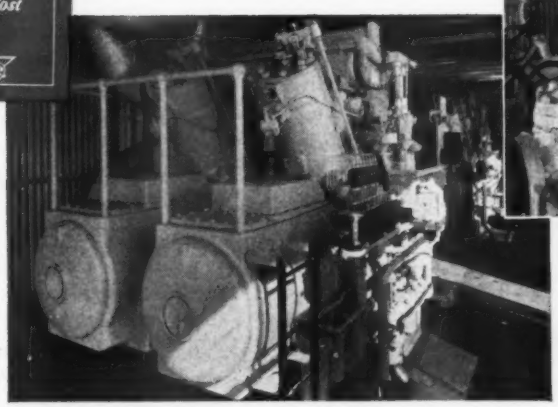
This 10-cylinder, 1100 hp GMV Turboflow compressor, known for extreme compactness and over-all operating economy, compresses residue gas from 1,000 to 2500 psi for return to field reservoir. Automatic control maintains constant pre-set discharge pressure.



This line-up of Cooper-Bessemer gas engines in generating plant consists of four 600 hp, 8-cylinder JS's driving Ideal 400 kw generators and three 280 hp, 5-cylinder Type GS engines driving Ideal 200 kw generators.

Exterior of generator building showing muffler, air filter and oil cooler equipment.

One of two Cooper-Bessemer Twin-line lean oil pumps in Sun Oil Starr County plant. High pressure side (foreground) is designed to operate on 41 API gravity lean oil, from 220 to 1100 psi while handling 248 gpm. Other side, in series, operates from 20 to 225 psi while handling 388 gpm.



Two Cooper-Bessemer GMX-4, V-Type gas engines, each direct-driving a Twin-line 6-cylinder lean oil pump through fire wall. Each GMX is rated 200 hp at 400 rpm.

The Cooper-Bessemer Corporation

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Drilling Control Unit by Cameron Iron Works, Houston, Texas

Molded Hycar parts by Murray Rubber Co., Houston, Texas

How HYCAR sits tight on a volcano

IN high pressure areas, or in wild cat locations, you are likely to find in the cellars of most drilling rigs a Cameron Drilling Control Manifold. Known in the trade as a blowout preventer, it safeguards the big investment in drill hole, equipment and helps protect the life of the worker.

It is here that Hycar plays its all-important part in safe drilling operation. Hycar OR 15 is used because of its superior oil-and-abrasion-resistant qualities. It must be oil-resistant because oil and gas seep into the drilling mud—Hycar can take it without deteriorating. It must have abrasion-resistance because Hycar ram packers are forced to seal tightly against the revolving drill pipe when the well "kicks". The higher the gas pressures in the well, the tighter the seal. Hycar is so tough that it resists the terrific strain of having the drill pipe raised, lowered, or rotated through the closed rams for hours!

Should the rubber seals fail, then the way is clear for blowout destruction. That's why Cameron Drilling Control units are equipped exclusively with seals made from HycarOR15.

What Hycar does here may give you an idea for a product improvement or development in oil field machinery. For not only does Hycar resist oil, gas, heat, weather and wear, but it has many other advantages, too. For technical bulletins, please write Department HE-9, B. F. Goodrich Chemical Company, Rose Building, Cleveland 15, Ohio.

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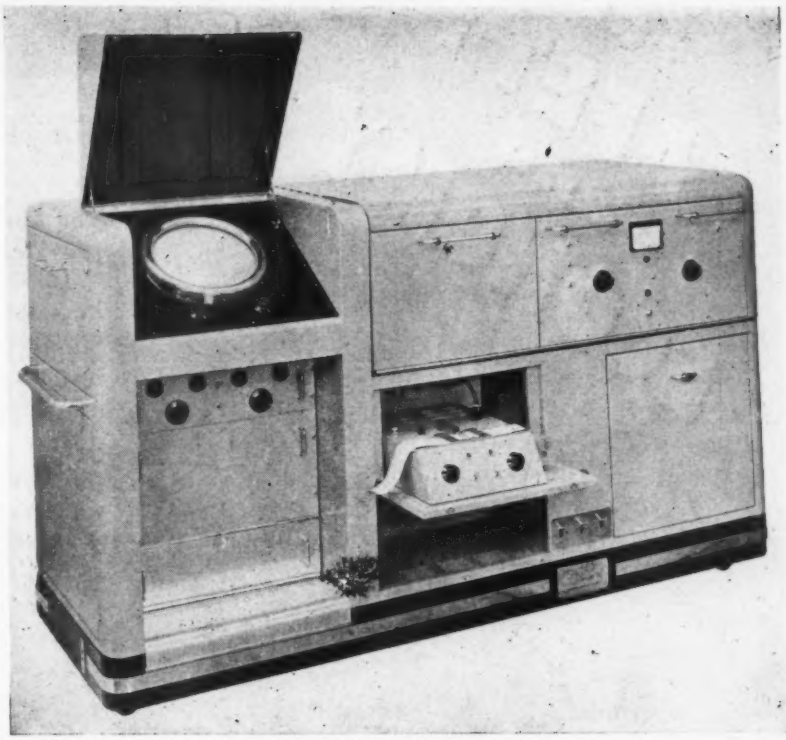
two I.P.C. associated companies operating in Iraq, Basrah Petroleum Co., Ltd., and Mosul Petroleum Co., Ltd. I.P.C. is at present the only one of the three companies with commercial production. The Iraq Government said the increased royalty rate was expected to give the country at least $47,600,000 additional revenue between January 1950 and October 1954.

Egypt Refinery Expansion

Crude production in the Ghardaqu, Ras Gharib, Sudr, and Asal areas of Egypt totaled 2,287,615 metric tons last year, it is reported by the Egyptian Embassy in Washington.

This volume of production, the embassy said, has stepped up preparations by the Egyptian Government for additional refinery capacity. Mammoud Abouzeid Bey, the government's oil expert, was recently in the United States to make arrangements for the production and refining of oil in Egyptian territory.

All crude produced in Egypt is refined at Suez where there are two refineries, one owned by Egypt and the other by the Anglo-Egyptian Oilfields, Ltd. The native-owned refinery is handling some 420,000 tons of crude annually but plans are now under way to add another 900,000 tons capacity by the end of this year.



Shown here is the infrared spectrometer, devised by Anglo-Iranian Oil Co., Ltd., in cooperation with Marconi Instruments, Ltd. It is used for studying catalysts in the desulfurization of petroleum products.

EUROPE

Catalysts Study

Anglo-Iranian using infrared spectrometer

THE SUNBURY research center of Anglo-Iranian Oil Co., Ltd., in England, is now using an infrared spectrometer with cathode-ray presentation, for investigating catalysts employed in removing sulfur from petroleum products.

The infrared spectrum may be used as a "finger-print" for the identification and estimation of components in a mixture. With cathode-ray presentation it makes visible the infrared spectrum of a material by showing it on a cathode-ray-tube screen of long persistence. The spectrum is rapidly and automatically scanned, so that any changes in the composition of a mixture are made immediately apparent. This instrument is ideally suited to following changes in the composition of a continuous stream.

The removal of sulfur compounds from petroleum products is of considerable importance to the oil industry, and the instrument can be used for testing catalyst efficiency. In this case the effluent from the reactor is continuously passed through the absorption cell of the spectrometer, and the change in concentration of the sulfur compound is continuously followed by noting the change in the spectrum trace displayed.

Bengen's discovery. — Bengen's discovery in 1940 that normal paraffins form crystalline solids with urea has created considerable scientific interest. It provides an entirely new method for separating these relatively unreactive hydrocarbons from mixtures in which they are present, such as gasoline, diesel oils, and other petroleum products. For this reason it may well have an important bearing on future techniques of improving these products, since normal paraffins considerably affect their behavior in use. The tendency of gasoline to knock in car engines would, for example, be reduced by removal of such paraffins. Diesel oils become less viscous at low temperatures, such as those existing in cold climates, although with these oils the mere removal of paraffins would not improve their performance in the engine.

The formation of the solid crystalline compound, or adduct, can actually be seen under the microscope. For example, normal octane readily forms an adduct with urea on the addition of a little methyl alcohol. Both octane and urea can be regenerated from the adduct by treatment with water. A model of the urea-paraffin adduct was shown to the fellows and guests of the Royal Society recently in London.

The spectrometer was manufactured by Marconi Instruments, Ltd., according to the designs and specifications of the research staff of Anglo-Iranian.

Italian Propane

Big tank order spots growth of industry

NORTH AMERICAN PETROLEUM GAS CORP., New York, has obtained an order from an Italian firm, Idrocarburi e Affini, S.p.A. (Pibigas) to supply all the equipment for 36 propane storage and filling stations in Italy, according to Virgil Stark, North American Petroleum Gas president.

The order includes tanks of a total capacity of 400,000 gal. with 12 storage tanks of 30,000 and 18,000 gal., 18 tanks of 5.000 gal., and 6 portable tanks of 1,750 gal. There are 10 tanks for truck and 10 tanks for trailer transportation. The order also includes compressors and pumps, 12 automatic dispensers, gas analyzers, and a large amount of special accessories.

It is the largest order ever made for propane bottle-filling equipment to be shipped from this country to Europe, Stark said. The North American company and North American Utility & Construction Corp. have orders for Italy covering gas-plant equipment for approximately $2,000,-

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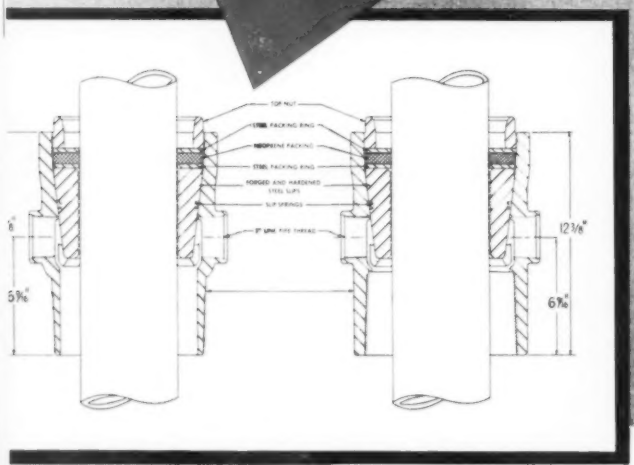
The Larkin Casing Head is designed to provide a safe and economical means of suspending and packing off casing strings in wells of medium depth and pressure. Simplicity and compactness, for ease of installation and neatness of hookup, are also incorporated in its design.

The unique ribbed internal construction of the Larkin Casing Head Body, with no sacrifice in strength, provides the greatest possible fluid opening from the casing annulus to the 2″ side outlets. Centralizers and Cementrol equipment pass through the head freely.



1. Cast Steel Body
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3. Oil and Wear Resistant Neoprene Packing
4. Tested to 2000 lbs. per square inch Hydraulic Pressure
5. Designed for free passage of centralizers and Cementrol equipment

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000, and orders for France to change over 30 gas plants to propane. All are finance by the Economic Cooperation Administration.

Fast growth.—Pibigas, organized in 1948, has one of the fastest-growing bottled-gas businesses in Italy, Stark said. The company recently merged its interests with another group, Soc. Italiana per il Gas (Italgas) which has franchises for gas distribution in 40 Italian cities, including Rome, Torino, Florence, and Venice.

Last year Pibigas used approximately 3,300,000 gal. of propane and butane, mostly imported, with 32 per cent from France, 10 per cent from the Netherlands, 40 per cent from Czechoslovakia and 18 per cent from Poland. The propane needs of the company are already at a rate of 6,000,000 gal. a year and will be over 12,000,000 gal. a year in the near future.

Discussing the Italian propane-butane business, Stark said the average consumption of an account in that country is 40 gal. a year, less than half that in the United States. Italy itself will soon have propane and butane available in large quantities from its own sources.

"It is expected that these products will be extracted in Italy from natural gas at a rate of more than 15,000,000 gal. a year," he said. "From the refining of approximately 6,000,000 tons a year of crude oil by the enlarged Italian refineries, it is expected that the propane-butane obtainable will amount to another 25,000,000 gal. a year. As the consumption of these products was 7,000,000 gal. a year in 1949, Italy will not have to import any such products in the future even if the consumption is greatly increased."

LATIN AMERICA

Products Line

120-mile Puerto Salgar-Bogota line surveyed

SURVEYING and engineering studies are now in progress in preparation for construction of a 120-mile products pipe line from Puerto Salgar to Bogota, Colombia.

The line, which will have a throughput of 7,000 bbl. per day, will furnish an economical and reliable means for supplying Bogota, a city of 400,000 population situated in a mountain valley. Its elevation is 8,000 ft.

The products line will follow a route through a mountain pass at 9,600-ft. elevation. Puerto Salgar is across the Magdalena River from La Dorada.

The need for reliable deliveries of refined products has been acute this year in periods when landslides have interrupted transportation. Automotive equipment has been stalled for days at a time for lack of gasoline.

The Ministry of Mines for the National Government of Colombia has authorized the state government of the Department of Cundinamarca to undertake the building of this products-line project, which will be financed by a loan of 6,000,000 pesos from Tropical Oil Co.

The Department of Cundinamarca has engaged the services of Williams Brothers Co. for surveying the route and conducting engineering studies to determine the diameter of the pipe, type of pumping equipment, and location of pump stations. C. M. Collins is engineer in charge of the Williams Brothers work. Floyd E. Warterfield, Jr., has been retained by Cundinamarca as consultant. No contracting of construction has yet been reported.

Connection planned.—A products line will probably be built from Puerto Berrio to Puerto Salgar by either the Central Government of Colombia or by a department government to connect with the proposed Puerto Salgar-Bogota line. In the postwar period Tropical built a products line of invasion pipe from its refinery at Barranca Bermeja to Puerto Berrio. The latter line with the two proposed lines would give continuous connecting systems for the movement of products from Barranca via Berrio and Puerto Salgar to Bogota.

Other products pipe-line projects which the Ministry of Mines has authorized department governments to undertake are as follows: Department of Caldas, line from La Dorada on the Magdalena River to the city of Manizales with 100,000 population; and Department of El Valle, line from Buenaventura on the Pacific Coast to Cali, a city of 120,000 population, located at an elevation of 6,000 ft.

There have been no announcements regarding the manner in which the Caldas and El Valle projects would be financed.

Shell Plans Crude Line

The Shell Group has applied to the Venezuelan Government for permission to build a crude-oil pipe line from Lake Maracaibo to Punta Cardon on the Paraguana Peninsula, at a cost of 70,000,000 bolivars ($2,300,000) according to an announcement made by W. L. Forster, general manager, Shell interests at Caracas.

Venezuelan Gas Line

WASHINGTON. — Construction of Venezuela's first natural-gas pipe line will get under way October 1, it was announced last week by the Venezuelan Embassy.

The line, to run almost 100 miles from the producing regions around Las Mercedes and Tucupido to Caracas, will have a primary construction cost of about $5,000,000 and total cost for the entire project will be more than $10,000,000, it was stated.

It is estimated that construction of the line will require from 10 to 11 months, and no technical difficulties such as are involved in laying pipe lines in the eastern part of the United States are anticipated.

Peruvian Activity

Two major operators get new exploration permits

TWO other major operators—Richmond Petroleum Co. and International Petroleum Co., Ltd.—have obtained permits from the Peruvian Government to carry out preliminary exploration operations in the northern part of the country.

Peru was opened up to preliminary exploration by foreign companies as a result of the decree law of last September 15. Whether full exploration concessions will be possible depends on the proposed new Peruvian petroleum law being submitted to the new congress which was to convene July 28.

Conorado Petroleum Corp. took out an exploration permit early this year and is now conducting surface geological and gravity-meter studies. The action of the two other companies indicates the interest in the Peruvian coastal region. The Richmond permit is good for a 2-year period.

The area of main interest is the Sechura desert lying to the south of Peru's present principal production which is operated by International around Talara. Conorado's operations are being carried out on the fringe of an area extending over about 2,000,000 acres.

Robert H. Ray Co., Houston, has one gravity-meter crew in the field for Conorado. Ruthven V. Pike, who joined the Conorado staff early this year after many years in foreign work with Standard Oil Co. (N. J.), is in charge of the Conorado exploration in Peru. The area is a section of the coastal plain about 125 miles long and 60 miles wide extending north from Chiclayo.

Nonexclusive permits. — The permits obtained under the September decree are nonexclusive and are granted for any of the so-called free areas of the country. A report to the government on the results of the work is required at the termination of the programs.

Standard Oil Co. of California, of which Richmond is a subsidiary, has long been interested in the possibilities in Peru, maintaining an office in Lima in charge of Frank Plaza. However, all foreign companies have been prevented from any extensive work by the legal situation. It is this difficulty that the new petroleum law is designed to remove.

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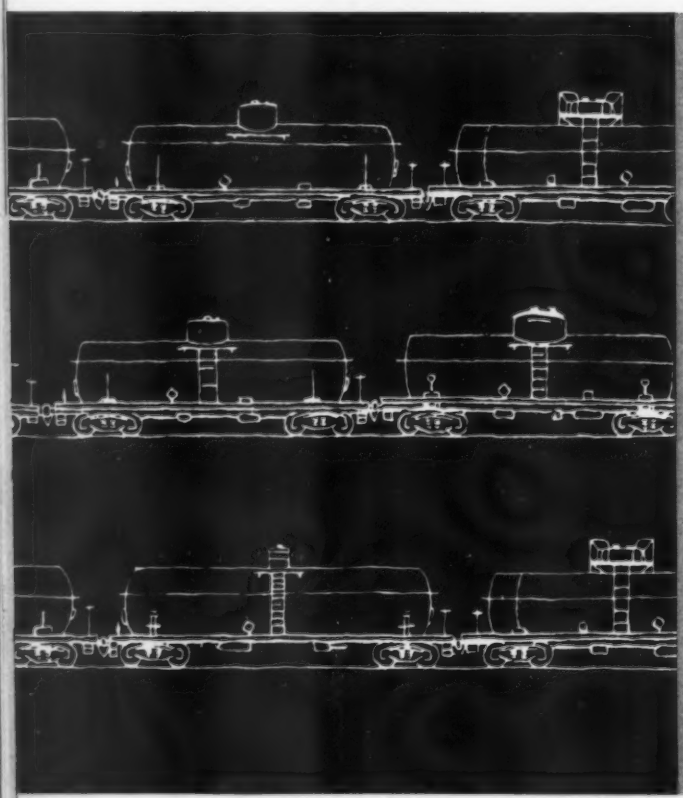

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42,000
tank cars

more than
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specialized types

all **LEASED**
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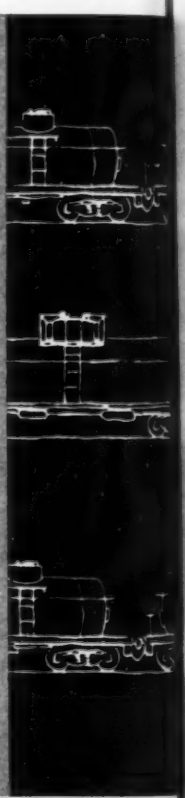
capital investment
to shippers



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PERSONALS

Texaco Veteran

Leach has been with firm continuously since 1916

J. S. LEACH, who last week was elected executive vice president of The Texas Co., with headquarters in New York City, is a veteran with the firm, having joined its sales department in Dallas as a bookkeeper in 1916.

A native of Allen, Tex., Leach graduated from Baylor University in 1915, with an A.B. degree.

Shortly after joining the firm in Dallas, he served as a traveling salesman, headquartered at Waco, Tex. In 1919 he was named agent at Wichita Falls, Tex., and in 1922 was appointed lubricating assistant of the Dallas district.

Named assistant superintendent of the Dallas district in 1924, a year later he was appointed superintendent of sales for that district. Serving as assistant manager of the sales department, southern territory, in 1927-28, he was named manager of that department in 1929.

Leach was named a vice president in 1938, with headquarters in Houston, and in 1949 was elected a director.

He is a member of the American Petroleum Institute, Mid-Continent Oil and Gas Association, Petroleum Industry War Council, PIC's general committee, and is chairman of the PIC marketing and distribution committee.

Gaylord L. Campbell, geologist at Oklahoma City for British-American Oil Producing Co., has been transferred in a similar capacity to the company's newly opened offices in Sidney, Neb. Other changes include: **William E. Butler,** appointed gager for Toronto Pipe Line Co.'s South Texas district; **George W. Murphy** and **Robert F. Penner,** Oklahoma City, named junior petroleum engineers; **Walter K. Arbuckle,** Tulsa, transferred to the Gulf Coast area as junior petroleum engineer; and **Earl W. Rogers,** named junior petroleum engineer in Wyoming, transferring from East Texas.

Robert P. Davidson, Los Angeles, has been transferred by General Petroleum Corp. to Casper, Wyo., where he will be attached to the land department of the Rocky Mountain division.

Barnett Fogleman, formerly assistant department manager of lubricating oils at Shell Oil Co.'s Houston refinery, has been transferred to the cracking department, replacing **A. S. Gilliam,** who recently resigned, as assistant department manager, catalytic-cracking division. Other changes include: **Carroll L. Marshall,** assistant department manager, Section B, lubricating oils, named first assistant department manager, lubricating oils; and **John G. Pratt, Jr.,** technologist, lubricating-oil department, named assistant department manager, Section B. Fogleman has been with the company since 1933, and has worked in cracking, research, technological, catalytic cracking, and lubricating-oil sections of the firm's refinery. Marshall joined Shell at Wood River, Ill., in 1930, and has served as chemist in the distilling, technological, cracking, and lubricating-oils section. Pratt began at Shell's Norco, La., refinery in 1946, as a technologist, and transferred to the lube-oil section in 1948. At Shell's Houston chemical plant, **J. M. Ralls, Jr.,** junior chemist in the laboratory, has been transferred in the same capacity to the research division, and **E. B. Wallace,** laboratory chemist, was moved to the shipping division as technical assistant.

Charles B. Karns, Esso Standard Oil Co., Pittsburgh, has been elected treasurer of the National Lubricating Grease Institute, succeeding **E. V. Moncrieff** of Swan-Fitch Oil Co., New York.

Gen. James H. Doolittle, former commander of the United States Eighth Air Force and now president of Shell Union Oil Co., is in the Far East making a survey of oil installations for the company.

Fred S. Nesmith, Jr., petroleum engineer at Beaumont, Tex., for Stanolind Oil & Gas Co., has been transferred to Hastings, Tex., as reservoir and development engineer.

A. H. Richards has been named geologist for the Oklahoma division of Anderson-Prichard Oil Corp., Oklahoma City. He will take over supervision of the company's geological work for the entire state, which formerly was directed in two districts. **Harry F. Buck** will assist Richards in the southern portion of the state, and **Robert Hammond** will assist in the northern Oklahoma area. **Walter Martz, Jr.,** will be in charge of field operations.

Robert E. Howe, whose appointment as superintendent of Sinclair Refining Co.'s Sinclair, Wyo., refinery replacing **M. H. Nolan** was announced last week, has assumed his new duties. A graduate of the Colorado School of Mines with a degree in chemical engineering in 1933, Howe joined Sinclair in 1934 as an engineer in the research and development department at East Chicago, Ind. He was transferred to Wyoming in 1936 and was named assistant superintendent in 1945. From 1946 to 1948 he was engineer in charge of design work on the fluid catalytic cracking units installed during the firm's recently completed modernization program. **E. H. Hausner** is now serving as assistant superintendent at the plant. He has been with the company since 1926, serving in East Chicago, Fort Worth, and Sinclair.

R. E. HOWE

Frederick H. Callaway, formerly senior petroleum engineer for Stanolind Oil & Gas Co., has been appointed reservoir engineering supervisor in the producing department, and **William H. Wheatley,** inspection supervisor, has been named senior mechanical engineer in the manufacturing department. Callaway joined Stanolind in 1946, following graduation from the University of Texas with a degree in petroleum engineering. Wheatley has been with Stanolind since 1946, and is a graduate of the University of Oklahoma.

H. C. Rector, assistant drilling superintendent of Standard Oil Co. of California's northern district, has been appointed drilling superintendent of the southern district, replacing the late E. N. Cooke. **F. G. Tratt** has been named assistant superintendent at Taft, Calif., succeeding Rector, and **E. M. Hoover** has been appointed to the new position of district exploration superintendent of the Great Basin district, which was established to co-

XUM

PERSONALS

ordinate exploration activities in Idaho, Nevada, and western Utah.

E. W. McNealy has been appointed assistant superintendent of The Texas Co.'s new Eagle Point Works at Westville, N. J. A native Texan, he began his career with the company as a summer employe at the Port Arthur, Tex., refinery. A graduate of Rice Institute, he joined the company permanently as a chemist at Port Arthur in 1932. He later served as assistant foreman, and worked at the Beacon, N. Y., laboratories. Named process engineer at San Antonio in 1939, he also served in this capacity in Los Angeles and New York. He was named assistant superintendent of the Casper, Wyo., Works in 1949, which position he held at the time of his new appointment.

Col. L. E. Cotulla, executive officer of the Armed Services Petroleum Purchasing Agency, has been transferred to quartermaster duties on Okinawa and has been succeeded on the ASPPA by a Navy officer, Capt. I. N. Tripi.

W. L. Forster, C.B.E., general manager of the Royal Dutch-Shell Group in Venezuela, has resigned his position effective October 31, 1950. Forster retires after having served Shell for 25 years, 3½ of which have been spent as manager in Venezuela. **R. C. McCurdy,** general manager for the western division of Shell Caribbean in Maracaibo, will succeed Forster. **W. L. G. Starrenburg,** former assistant to the general manager in Caracas and recently in Maracaibo, will succeed McCurdy as manager of the western division.

R. L. Gibson, Shell Oil Co., Houston, has been named division exploitation engineer to replace **R. J. Dobson,** now on leave at The Hague, the Netherlands. **J. W. Moore** will replace Gibson as division reservoir engineer. Other changes include: **T. M. Gruner,** subsurface geologist at Corpus Christi, transferred to Houston as area geologist; **W. P. Binger** and **Z. Fekete,** both junior mechanical engineers, named mechanical engineers, Houston regional staff; **J. M. Kortright,** junior geophysicist, transferred from the regional exploration department to the Houston area as a seismologist; and **R. C. Wright,** junior mechanical engineer, named gas-design engineer on the regional production staff.

C. M. LaLonde, assistant superintendent of the West Texas production district for Phillips Petroleum Co., Odessa, has been named assistant superintendent of the Plains division at Amarillo. He will be succeeded in Odessa by **C. M. Boles,** who transfers from Alvin, Tex.

R. J. Hurt, formerly district land man in Southwest Texas for Pan American Production Co., has resigned to enter business for himself in Corpus Christi. He has spent 20 years in land, geological, and scouting work on the Gulf Coast.

Robert Womack, district geologist, and **J. W. Desmond,** district land man, will be in charge of the California Co.'s newly created Mississippi district office at Jackson. Other changes in the company include: **F. J. Allen,** transferred from Venice, La., to the engineering staff at New Orleans; **L. C. Soileau, III,** transferred from Harvey and named engineer in charge of the Main Pass and Romere Pass areas; **C. W. Hagans,** transferred from Brookhaven, Miss., to Shreveport; **C. M. Hauptman,** transferred from the northern Louisiana division, Natchez, to the southern exploration division at Shreveport; **D. L. Kendall,** production department, western division, transferred from Neiber Dome to Rangely, Colo.; **W. Z. King,** transferred from Lake St. John to the western division, Rangely; **C. H. Lautier,** moved from the Mid-Continent division, Ardmore, Okla., to Harvey, La.; **R. A. Roberts,** transferred from Harvey to the engineering staff at New Orleans; **L. W. Ruthardt,** moved from Hico-Knowles to Lake St. John; and **H. S. Usrey,** transferred from Hico-Knowles to Lake St. John.

GAS FOR HUDSON VALLEY.—Ernest R. Acker, left, president of Central Hudson Gas & Electric Corp., and George S. Young, executive vice president, Columbia Gas System, Inc., are shown as they turned a valve last week which permitted the first natural gas to cross the Hudson River.

J. J. Schillinger has been named assistant manager of the right-of-way department for General Petroleum Corp., Los Angeles.

George M. Jenkins has been appointed district geologist of the Ark-La-Tex area for La Gloria Corp., Corpus Christi. He will be headquartered at Shreveport, with **William G. Berry,** district land man.

Glen A. Nell, Casper, Wyo., has been named manager of Shar-Mex in Mexico, a firm owned by P. T. Sharpless, Cincinnati, which will be supervised by Sharpless Oil Corp.

U. R. Laves, valuation geologist for Kirkpatrick & Bale, Inc., prior to that firm's dissolution, has opened offices in the Apco Tower in Oklahoma City as a consulting geologist. Laves, formerly of Tulsa, joined Kirkpatrick & Bale in Oklahoma City early in 1948.

E. V. Murphree, president of Standard Oil Development Co., research affiliate of Standard Oil Co. (N. J.), has been named to the general advisory committee on the Atomic Energy Commission.

Billie M. Byrd, assistant to the corporate secretary, United Gas Pipe Line Corp. and Union Producing Co., has been named assistant secretary. Other changes in the companies include: **J. W. Wood,** chemical engineer in the Shreveport research department, transferred to the general office as assistant superintendent; **J. F. Collier,** section foreman in the Wichita Falls district, transferred to San Antonio in the same capacity; **T. F. Estes,** section foreman in the San Antonio district, moved to Wichita Falls in the same capacity; **J. M. Lennie,** chemist in the Beeville district, transferred to the Shreveport general office in the same capacity; **Lucian C. Carter,** senior engineer in the Houston division, named division engineer; **F. R. Wright,** assistant engineer in the Shreveport general office, transferred to the Jackson district in the same capacity; **William A. Hooper,** engineer in the Houston office, transferred to Wichita Falls and named division engineer; **Harry Castle, Jr.,** division engineer at Wichita Falls, transferred from Wichita

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EYES that see 5 MILES AWAY!

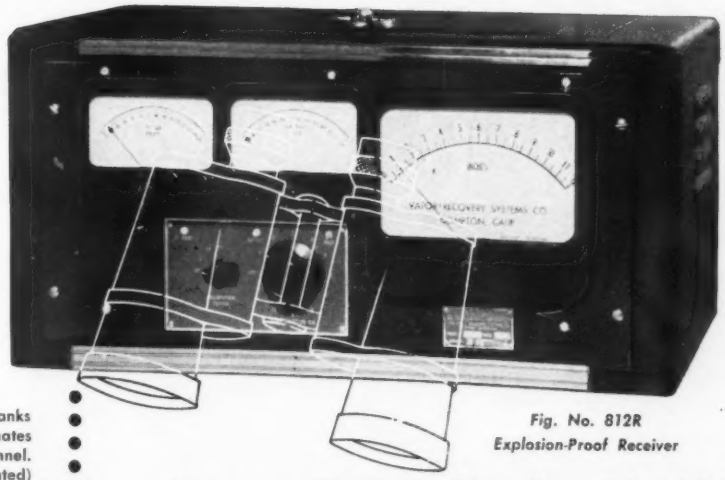

Fig. No. 812R
Explosion-Proof Receiver

Accurate Remote Reading Liquid Levels with the "VAREC" Electronic Gauger

No magic, but "VAREC"'s application of the science of electronics to the problem of tank gauging is now giving users the utmost in safety, convenience and accuracy in obtaining liquid levels at a distance from their tanks.

The "VAREC" Electronic Gauger Receiver illustrated is the multi-tank *explosion-proof* model on which you can gauge any one of 24 tanks by a twist of your fingers. Power is on only at the tank being gauged. Behind the front panel, all electrical components and wiring are enclosed in an explosion-proof housing. Wire count to the tanks is less than that of any other remote gauging system and wire size is smaller due to the low current used.

Investigate this "VAREC" Electronic Gauger for your own gauging problem. Write today for a copy of "Remote Gauging at its Best!" and call in a "VAREC" Representative.

FEATURES

SAFE . . . No climbing slippery tanks during wet or icy weather—eliminates toxic gas hazard for personnel. *Explosion-proof* Receiver (illustrated) designed in accordance with standards for industrial control equipment as used in hazardous areas. Transmitter's electrical section completely isolated from tank vapors. Built to meet requirements of explosion-proof equipment.

ACCURATE . . . Accuracy is only limited by type of float gauge used. Measures liquid levels to ±1/16th inch with "VAREC" 253 Series Automatic Tank Gauges.

ECONOMICAL . . . Low initial cost; low installation cost; low maintenance cost. Pays for itself in manhours saved.

EASY TO USE . . . No waiting to take readings—you need only select the tank for a momentary or continuous accurate gauge reading. Instruments do not require resetting after power shutdown.

TROUBLE FREE MAINTENANCE. Designed to operate many years without service. Electronic elements function at ½ to ⅓ rated capacities. Plug-in parts easily replaceable.

INSTALLATION AND SERVICE POLICY. Engineering supervision of installation is available. Annual or biennial factory routine service check offered at nominal charge.

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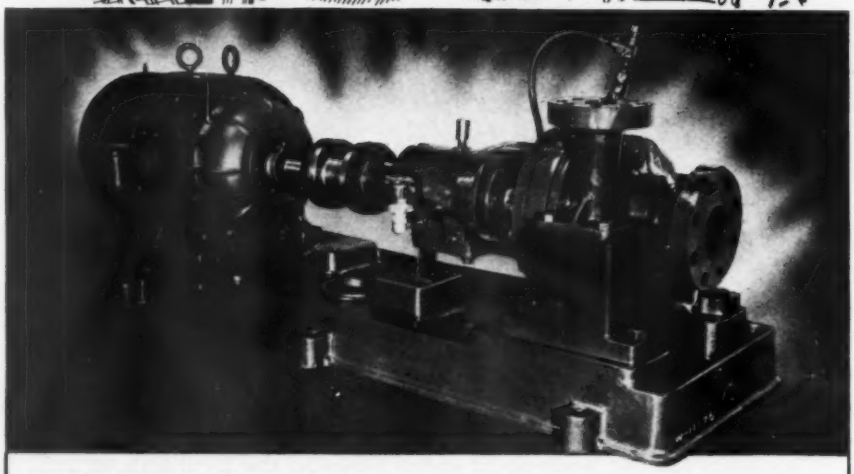
Worthington's New Process Pump a Hit With Refinery Men, From Operators to Management



A TRULY VERSATILE PROCESS PUMP! The Worthington Type HM Centrifugal is available with conventional packed box or mechanical seal, in capacities up to 650 gpm, heads up to 475 ft. and in a wide choice of materials — cast iron, bronze, stainless steel, carbon steel and Worthite.

Seldom has any pump received so hearty a welcome at all levels of refinery organization as Worthington's Type HM.

Operators like its ruggedness and thorough dependability

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Maintenance men praise its quick adaptability to either a packed stuffing box or mechanical seal, its spacer type coupling that allows removal of the rotor assembly without disturbing piping or driver, and its over-all simplicity of construction that assures such easy inspection and repair

Engineers and power plant men are impressed by its correct hydraulic and mechanical design, low NPSH and power requirements, and sustained high efficiency

Management realizes that the long life, low cost upkeep and versatility of the Type HM mean a first class capital investment for present and future process pumping

GET ALL THE FACTS

Contact our nearest District Office or write direct for Bulletin W-341-B14 Learn why the Type HM is still further proof that *there's more worth in Worthington Worthington Pump and Machinery Corporation, Centrifugal Pump Div., Harrison, New Jersey*

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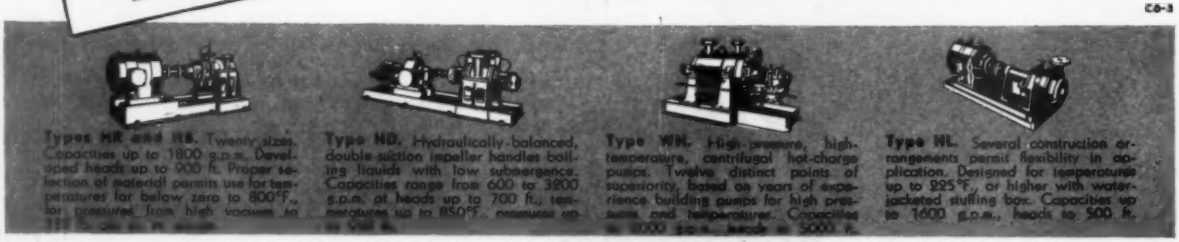


Types HR and HS. Twenty sizes. Capacities up to 1800 g.p.m. Developed heads up to 900 ft. Proper selection of material permits use for temperatures far below zero to 800°F., for pressures from high vacuum to [illegible]

Type HD. Hydraulically-balanced, double-suction impeller handles boiling liquids with low submergence. Capacities range from 600 to 3200 g.p.m. at heads up to 700 ft., temperatures up to 850°F., pressures up to [illegible]

Type WH. High-pressure, high-temperature, centrifugal hot-charge pumps. Twelve distinct points of superiority, based on years of experience building pumps for high pressure and temperature. Capacities to 2000 g.p.m. heads to 5000 ft.

Type HL. Several construction arrangements permit flexibility in application. Designed for temperatures up to 225°F., or higher with water-jacketed stuffing box. Capacities up to 1600 g.p.m., heads to 500 ft.

Falls to Jacksonville, Tex.; and **William W. Ross,** division engineer, Jacksonville, transferred to New Braunfels.

C. J. Gardner, assistant superintendent at Sinclair Refining Co.'s East Chicago, Ind., refinery, has been transferred to the Wellsville, N. Y., refinery as assistant superintendent. Formerly superintendent at Sinclair's Coffeyville, Kans., refinery before going to East Chicago, Gardner succeeds **G. W. Hardell,** who is returning to make ready for resumption of operations of Sinclair Rubber, Inc., at Houston, where he formerly served as process superintendent prior to the company's shutdown in September 1946. **George A. Blaine,** who has been in charge of the technical department at East Chicago has been appointed assistant superintendent there succeeding Gardner, and **L. R. Bunger,** formerly Blaine's assistant, will become head of the technical department.

C. J. GARDNER

Arthur Laughlin, pipe-line foreman at Caney, Kans., for Cities Service Gas Co., has resigned, and has been succeeded by **F. L. Vogler,** who was transferred from Grabham, Kans. **Donald E. Sandstrum,** foreman at Guymon, Okla., was moved to Grabham to replace Volger, and **Brice Bloodgood** was transferred from Wichita to replace Sandstrum at Guymon. **C. G. Tuttle** will replace Bloodgood at Wichita, and **V. E. Smith** will transfer to Wichita from Pampa as production engineer to relieve **Robert Skelton,** who is being moved to Hugoton, Kans., as production engineer to replace **Bob Graves.** Graves recently was moved from Hugoton to Kansas City, replacing **Roy Bressie,** who resigned to enter private business.

Jack Glenn Wheeler, chemical engineer, has joined Southern Alkali Corp., at Lake Charles, La.

Frank S. Cannon, Mississippi division manager of Pan-Am Southern Corp., Jackson, has been elected chairman of the Mississippi Petroleum Committee for 1950-51.

William Davis, formerly with Sohio Petroleum Co. at Evansville, Ind., has resigned to join the geological staff of **George Schoonmaker,** independent oil operator at Evansville.

James W. McColl has been appointed assistant to **H. Ben Cox,** superintendent of the land department of Cities Service Oil Co. (Del.), Bartlesville, Okla. He has been with the company since 1926.

Robert M. Swesnik, with Anderson-Prichard Oil Corp. as geologist since 1946, has resigned to become a subsurface geologist at Dallas for General American Oil Co. **G. F. Shepherd** is chief geologist for the firm.

Gale G. Billings, assistant area superintendent at Cushing, Okla., for Shell Pipe Line Co., has left for Venezuela, where he will join the Shell-Caribbean Group on a special assignment.

Ralph Watson, Lago Oil & Transport Co., Ltd., has been named assistant division superintendent, receiving and shipping, at the Aruba, N.W.I., refinery. Other changes include: **R. C. Baum,** appointed process foreman in charge of shore operations, receiving and shipping department; **N. M. Bell,** named process foreman; **J. F. Flaherty,** appointed shift foreman; and **L. D. McBurney,** named process foreman in charge of cracking units.

Gerdes W. Rice, Dallas, has been appointed superintendent of the right-of-way and claims department for Lone Star Gas Co.

Dr. Edmund M. Spieker has been appointed chairman of the Committee on Geophysics and Geography's panel on geology, Research and Development Board, Department of Defense, Washington.

E. L. Fipps has rejoined the geological department of Plymouth Oil Co.'s Midland, Tex., office, moving from Evansville, Ind., where he had been stationed for approximately 6 months. Prior to his Evansville assignment, Fipps was in charge of the company's Oklahoma City office. **Russell C. Conkling,** Midland, is chief geologist, with **W. D. Lane** as general superintendent for the region handled by the Midland headquarters.

Fritz W. Mueller has been named manager of the land and geological department of Heep Oil Corp., Austin. He formerly was geologist for Skelly Oil Co. and **P. Rutherford** in Houston.

J. R. Story has become associated with Southland Royalty Co., with headquarters at Midland, Tex. He formerly was in the geological department of Cities Service Oil Co.'s Permian district. Story will work as a geologist, with **Lloyd Mills,** district geologist for the Permian basin. Story has been with Cities Service for 3 years, and is a graduate of Texas Technological College, Lubbock.

Don Bills, geologist for Cities Service Oil Co., has been transferred from West Texas to the company's Olney, Ill., office.

Ernest Loveless, Wichita, Kans., has joined Freeman Lomelino as a geologist at Olney, Ill.

Robert J. Garrett, geologist at Oklahoma City for Superior Oil Co. of California, who was named manager of Middle East operations, recently has gone to Bahrein to take up his new duties.

Paul Lamer has been named geologist in charge of Intex Oil Co.'s newly opened district offices in Oklahoma City.

Dr. Louise Jordan has resigned from Sun Oil Co. as geologist in the Amarillo offices following 10 years of company service. Her oil industry experience includes 4 years as geologic adviser to the Turkish Government. She earned the distinction of being the first woman to receive the doctorate degree in geology from Massachusetts Institute of Technology.

DEATHS

Craig Cullinan, Sr., Houston oil man, died August 15. He was the son of the late J. S. Cullinan, financier and oil man.

Ralph W. Sexson, 65, operating manager of the White Eagle division of Socony-Vacuum Oil Co., Kansas City, Mo., died in Omaha August 10.

Harry T. Earl, vice president of Tide Water Associated Oil Co., died recently in Oakland, Calif. He had been with the company for more than 46 years.

Edward L. Klepfer, 62, Tulsa oil broker, died August 9.

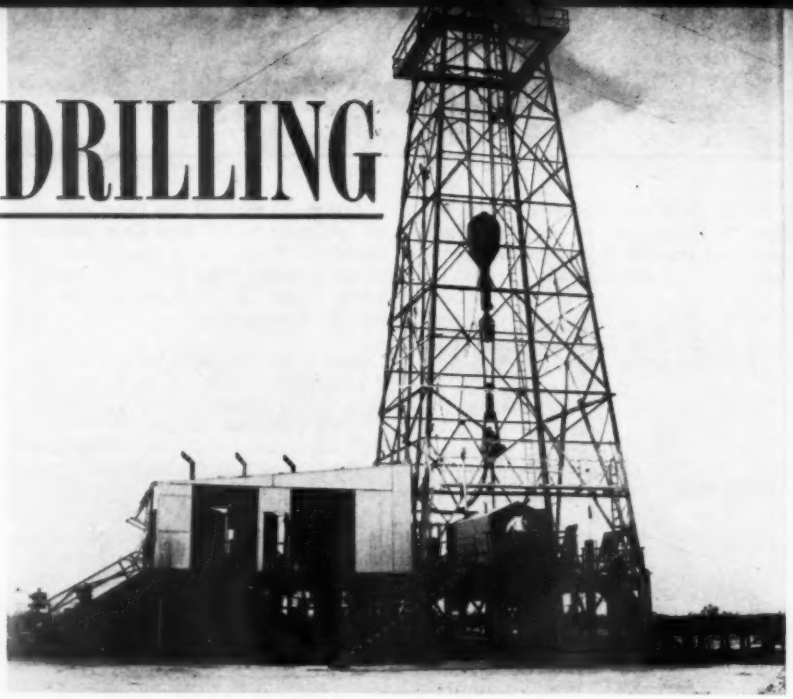
Russell J. Patterson, 69, Overton, Tex., vice president of Patterson Oil Co., Atmore, Ala., died in Shreveport August 10, from injuries received in an automobile accident.

XUM

PEGASUS DRILLING

Making hole in this deep field is complicated by a variety of headaches—not the least of which is the prevalence of lost-circulation zones.

by Roy F. Carlson
Dallas District Editor



Heavy-duty power rig at work in Pegasus field. Although there are some mast-type rigs doing deep drilling in the area, most of the rigs are of the type shown here.

EXTREME depths, lost-circulation zones, hard chert, high-pressure gas formations, and a long salt section combine to make a difficult problem of drilling in West Texas' Pegasus field.

The depth of the wells alone creates problem enough both in drilling time and in the care of equipment and operations necessary to prevent failure in the deep holes. The chert formations add to the problem because the worst of these are found below 11,000 ft., making the round trips for bit replacement long and frequent with little penetration per bit.

Gas zones and lost-circulation trouble make a four-string casing program virtually mandatory, require close control of mud properties, and necessitate stage cementing of one kind or another. The long salt section raises hob with the mud early in the drilling of a well and the mud must either be jetted away or undergo a thorough and expensive treating program.

Surface Hole

Lost-circulation troubles begin at the grass roots. The highly porous caliche evaporite deposits are found immediately below the surface and to depths of about 100 ft. in Pegasus field as they are in most of West Texas. These formations take mud and water, but drill very rapidly and are cased off along with water-bearing formations by a string of surface pipe.

Drilling of the surface hole is accomplished with water, some spud clay, and a little gel. Below the surface pipe the mud becomes saturated with salt from a salt section in the anhydrite formation. The second string of casing is set through this salt section. The casing point varies widely in the field, however. A sandy porous zone that tends to stick the drill pipe, and where circulation is sometimes lost is found in the top of the San Andres formation.

Where possible the string is set in a hard dolomite section above the San Andres so that the salt mud may be discarded or the salt treated out. Fresh-water mud is usually used to drill the sandy zone if the upper dolomite formation is available as a casing seat. This porous zone can be drilled with fresh-water mud much more easily than with salt-water mud. However, in the northern part of the field the dolomite zone is absent, so the soft porous zone must be drilled through with salt-water mud and the casing set in a hard formation below it at about 5,100 ft.

Water for drilling and production operations at Pegasus is obtained from specially drilled water wells, pumped by individual gas-engine-driven jacks. This is unit No. 5 on Magnolia Petroleum Co.'s Roy Glass lease.

Third Casing String

Below the salt string of casing fresh water is used as a drilling fluid, and is used until a depth of 5,000 ft. or more is reached. From here down bad lost-circulation zones may be encountered almost anywhere and it is necessary to mud up to prevent loss of returns. Lost-circulation material is used in quantity before the third casing point is reached. Through this section water loss is usually kept at 15 cc. or less and viscosity is kept at 38 to 40 seconds A.P.I. The lost-circulation section varies from location to location. and may be found at any depth from 5,000 ft. to 9,000 ft. The zone is highly fractured and requires close control of mud.

In fighting the lost-circulation section several kinds of materials have been used. Nearly all fibrous materials have been used in the mud without very much success. Special

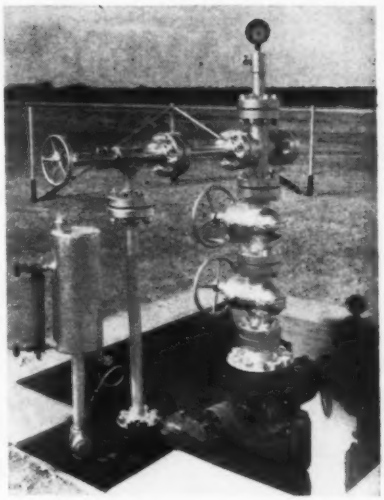
plastics and mud additives have been tried to help in keeping returns but these materials, too, have been unsuccessful. The new granular perlite material also was used with little success. Cement and Calseal have been used to plug back the hole, but after redrilling, returns were again lost.

The formation below the porous San Andres is the Wolfcamp, a gas-producing formation. One blowout at least has occurred in the field from this formation and extreme care must be used in drilling it. Most operators chose to set a third string of pipe on top of the Wolfcamp to eliminate the lost-circulation zones, and then use heavy mud in drilling the gas formation. However, some wells have been drilled through both the lost-circulation zone and through the Wolfcamp to a depth of 12,000 ft. without the third string.

In these wells, however, extreme care must be taken of the mud. Mud weights of less than 9.3 lb. per gallon will let the gas from the Wolfcamp kick, and weights over 9.7 will tend to cause loss of circulation, although higher weights have sometimes been used successfully. Large amounts of mud must be kept on hand at all times, and the mud must contain lost-circulation materials because they do give some help.

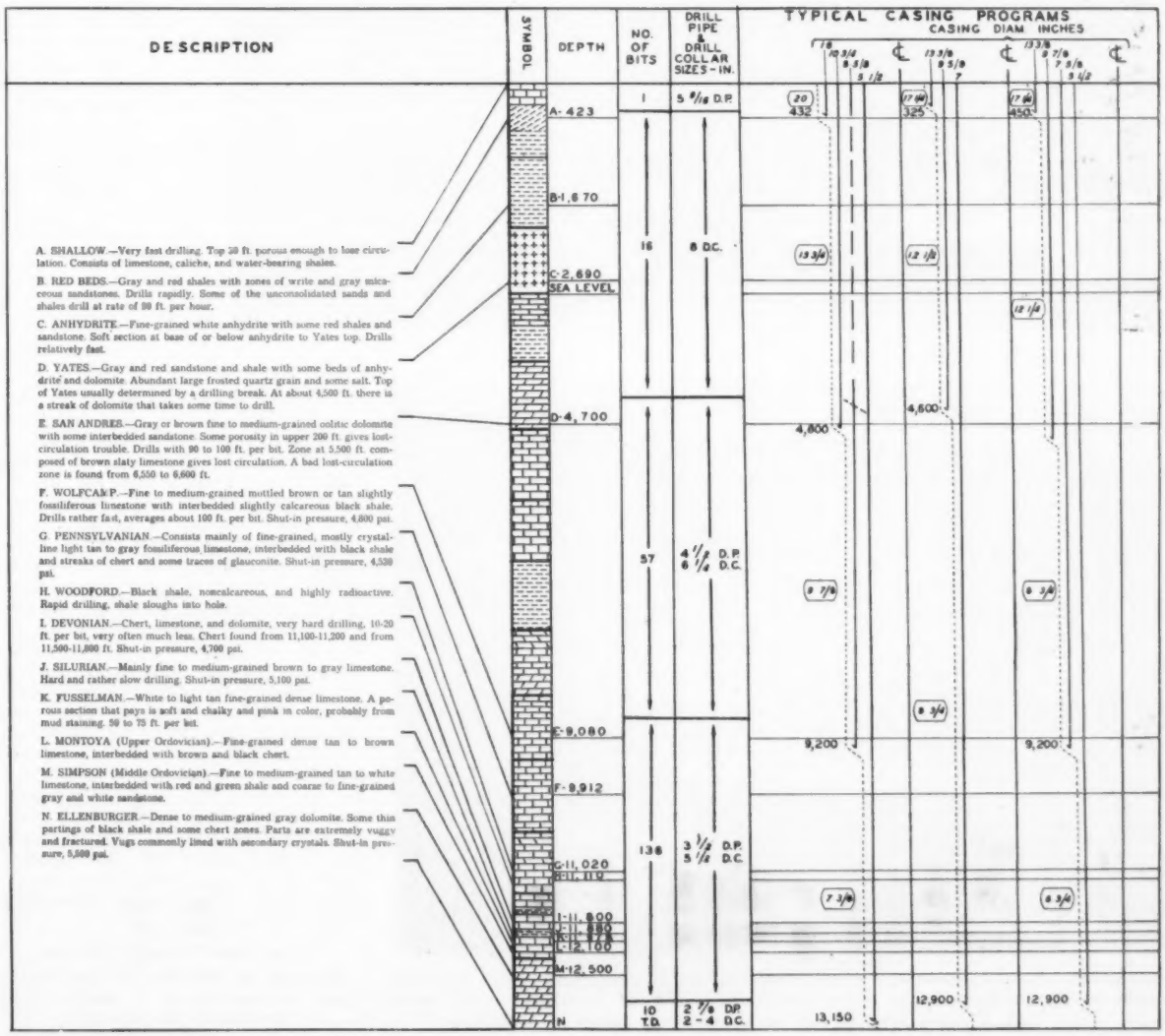
At about 11,000 ft. the Woodford shale gives trouble by sloughing in around the bit. To keep the hole from caving, operators carry extremely high-viscostity muds and maintain a high gel strength. Viscosities of 180 to 200 seconds have been used, and 10 and 50-g. 0 and 10-minute gels have been used. The average is probably 60 to 65 seconds and 0 and 5 g. The extremely hard Devonian chert

(Continued on page 128)



High-pressure christmas tree assembly at Pegasus field. The small lubricator at left continuously feeds a small quantity of paraffin solvent into the flow line.

This drawing correlates for the Pegasus field tops of the pay formations with the casing points now used, and also gives descriptions of the formations drilled. As such, it shows "why the casing strings are set where they are."

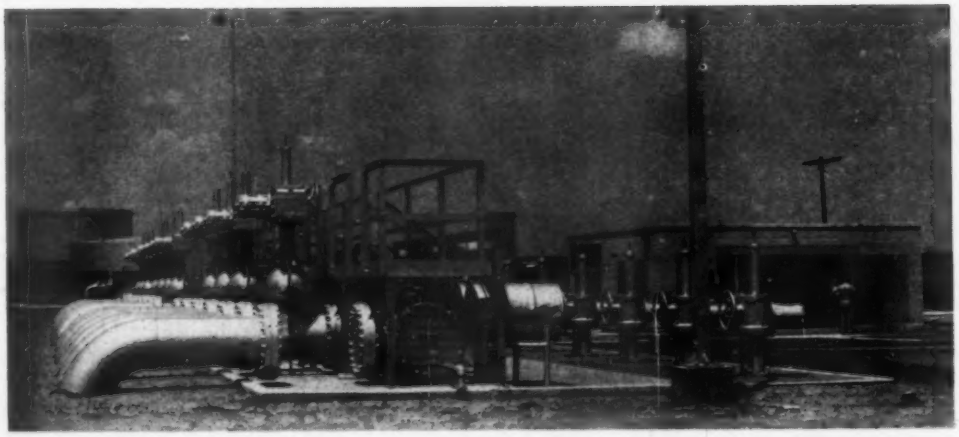

DESCRIPTION
SYMBOL
DEPTH
NO. OF BITS
DRILL PIPE & DRILL COLLAR SIZES - IN.
TYPICAL CASING PROGRAMS
CASING DIAM INCHES
A. SHALLOW.—Very fast drilling. Top 30 ft. porous enough to lose circulation. Consists of limestone, caliche, and water-bearing shales.
B. RED BEDS.—Gray and red shales with zones of write and gray micaceous sandstones. Drills rapidly. Some of the unconsolidated sands and shales drill at rate of 90 ft. per hour.
C. ANHYDRITE.—Fine-grained white anhydrite with some red shales and sandstone. Soft section at base of or below anhydrite to Yates top. Drills relatively fast.
D. YATES.—Gray and red sandstone and shale with some beds of anhydrite and dolomite. Abundant large frosted quartz grain and some salt. Top of Yates usually determined by a drilling break. At about 4,500 ft. there is a streak of dolomite that takes some time to drill.
E. SAN ANDRES.—Gray or brown fine to medium-grained oolitic dolomite with some interbedded sandstone. Some porosity in upper 200 ft. gives lost-circulation trouble. Drills with 90 to 100 ft. per bit. Zone at 5,500 ft. composed of brown slaty limestone gives lost circulation. A bad lost-circulation zone is found from 6,550 to 6,600 ft.
F. WOLFCAMP.—Fine to medium-grained mottled brown or tan slightly fossiliferous limestone with interbedded slightly calcareous black shale. Drills rather fast, averages about 100 ft. per bit. Shut-in pressure, 4,800 psi.
G. PENNSYLVANIAN.—Consists mainly of fine-grained, mostly crystalline light tan to gray fossiliferous limestone, interbedded with black shale and streaks of chert and some traces of glauconite. Shut-in pressure, 4,530 psi.
H. WOODFORD.—Black shale, noncalcareous, and highly radioactive. Rapid drilling, shale sloughs into hole.
I. DEVONIAN.—Chert, limestone, and dolomite, very hard drilling, 10-20 ft. per bit, very often much less. Chert found from 11,100-11,200 and from 11,500-11,800 ft. Shut-in pressure, 4,700 psi.
J. SILURIAN.—Mainly fine to medium-grained brown to gray limestone. Hard and rather slow drilling. Shut-in pressure, 5,100 psi.
K. FUSSELMAN.—White to light tan fine-grained dense limestone. A porous section that pays is soft and chalky and pink in color, probably from mud staining. 50 to 75 ft. per bit.
L. MONTOYA (Upper Ordovician).—Fine-grained dense tan to brown limestone, interbedded with brown and black chert.
M. SIMPSON (Middle Ordovician).—Fine to medium-grained tan to white limestone, interbedded with red and green shale and coarse to fine-grained gray and white sandstone.
N. ELLENBURGER.—Dense to medium-grained gray dolomite. Some thin partings of black shale and some chert zones. Parts are extremely vuggy and fractured. Vugs commonly lined with secondary crystals. Shut-in pressure, 5,500 psi.
A-423
B-1,670
C-2,690
SEA LEVEL
D-4,700
E-9,080
F-9,912
G-11,020
H-11,112
I-11,200
J-11,880
K-12,100
M-12,500
N
1
18
57
136
10
TD
5 9/16 D.P.
8 D.C.
4 1/2 D.P.
6 1/4 D.C.
3 1/2 D.P.
5 1/4 D.C.
2 7/8 D.P.
2 - 4 D.C.
20
432
17 (44)
325
17 (44)
450
13 3/4
12 1/2
12 1/4
4,600
4,800
9 7/8
8 3/4
8 3/4
9,200
9,200
7 3/4
8 3/4
13,150
12,900
12,900

XUM

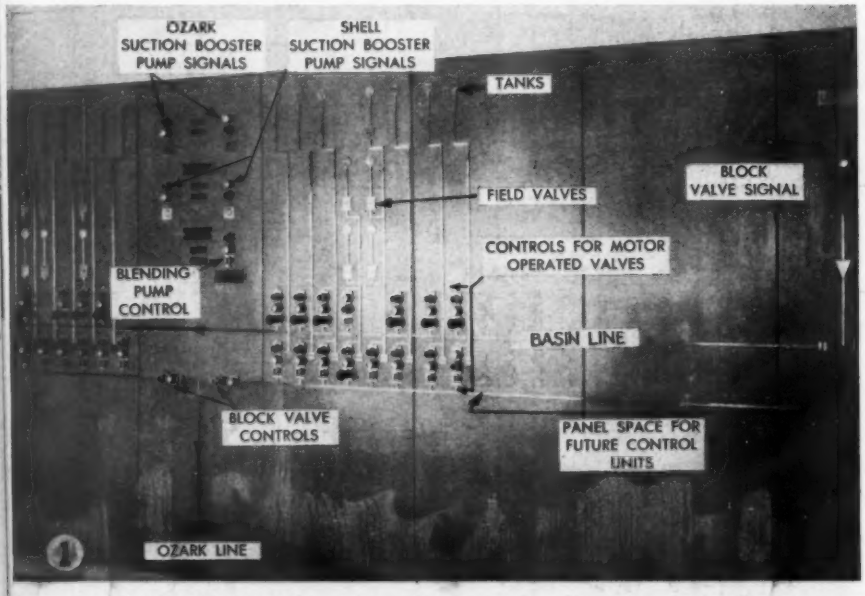
SWITCH-BUTTON *Control* at Basin-Ozark System Terminal

by R. B. Tuttle

WATCHFUL EYES.—This crew of gagers keep accounts on the many oil tenders entering and leaving the Cushing terminal. They are: L. C. Orr, chief gager, Shell Pipe Line Corp.; C. G. Standlee and O. J. Wood, assistant chief gagers, Shell Pipe Line Corp.; D. O. Phillips, tank-farm gager, Shell, and J. C. Chastain, chief gager, Basin system.



"SWITCH - BUTTON" PIPE-LINE STORAGE TERMINAL.—At this Cushing, Okla., terminal of the Basin-Ozark system, the large battery of motor driven valves at left is controlled from a panel board located in the building. The lines which connect to the header tank-farm serve more than 2,000,000 bbl. of tankage.



1. TRAFFIC ROUTER.—From this control board located in the gager's office, incoming crude oil from the Basin section of the Basin-Ozark System can be directed to any of 24 tanks. Pilot or signal lights provide an instantaneous picture of operations.

THE extent to which the modern pipe-line station has replaced raw manpower with automatic instruments, robot valves, and remote controls is well illustrated in the huge terminal of the Basin-Ozark system near Cushing, Okla.

Switch-button control.—From a centrally located control panel, gagers route crude oil to and from tanks merely by turning small switch buttons. (Photo 1.) They have an instantaneous picture of the entire terminal-storage operations merely by glancing at the control board which diagrams the 24 tanks and connecting lines now in operation.

Signal lights and instruments tell when a valve is open or closed, measure the rate of flow, and the temperature and gravity of the oil. Pipe lines connecting the various tanks and the main headers are shown schematically on the control board, making it also a large-scale flow chart of the operation.

From West Texas to Illinois

Cushing is the hub of the Basin-Ozark system, built to move crude

(Continued on page 87)

XUM

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"NATIONAL BLUE" FIELD LAB . . . . .

Under this battered fedora with the smudges of "National Blue" paint on it is "the guy from National Supply". To you, he's the fellow who really knows National and "Ideal" machinery, Superior engines, Spang tubular products. And will gladly share that knowledge with you. But to us at National . . .

He's the fellow who has helped us keep "National Blue" equipment ahead of the pack, has told us ways to make a rig, a pumping unit, or an engine easier for you to operate and maintain, and where we could improve our products to give better service at lower cost. He's our eyes and ears and fingers down in Texas, out in California, up in an Alberta snow-drift.

Multiply the National Supply field man you know by the scores of others at work all over North America . . . their combined know-how is another advantage of dealing with the largest builder and distributor of the most completely integrated line of oil country equipment . . . The National Supply Company.

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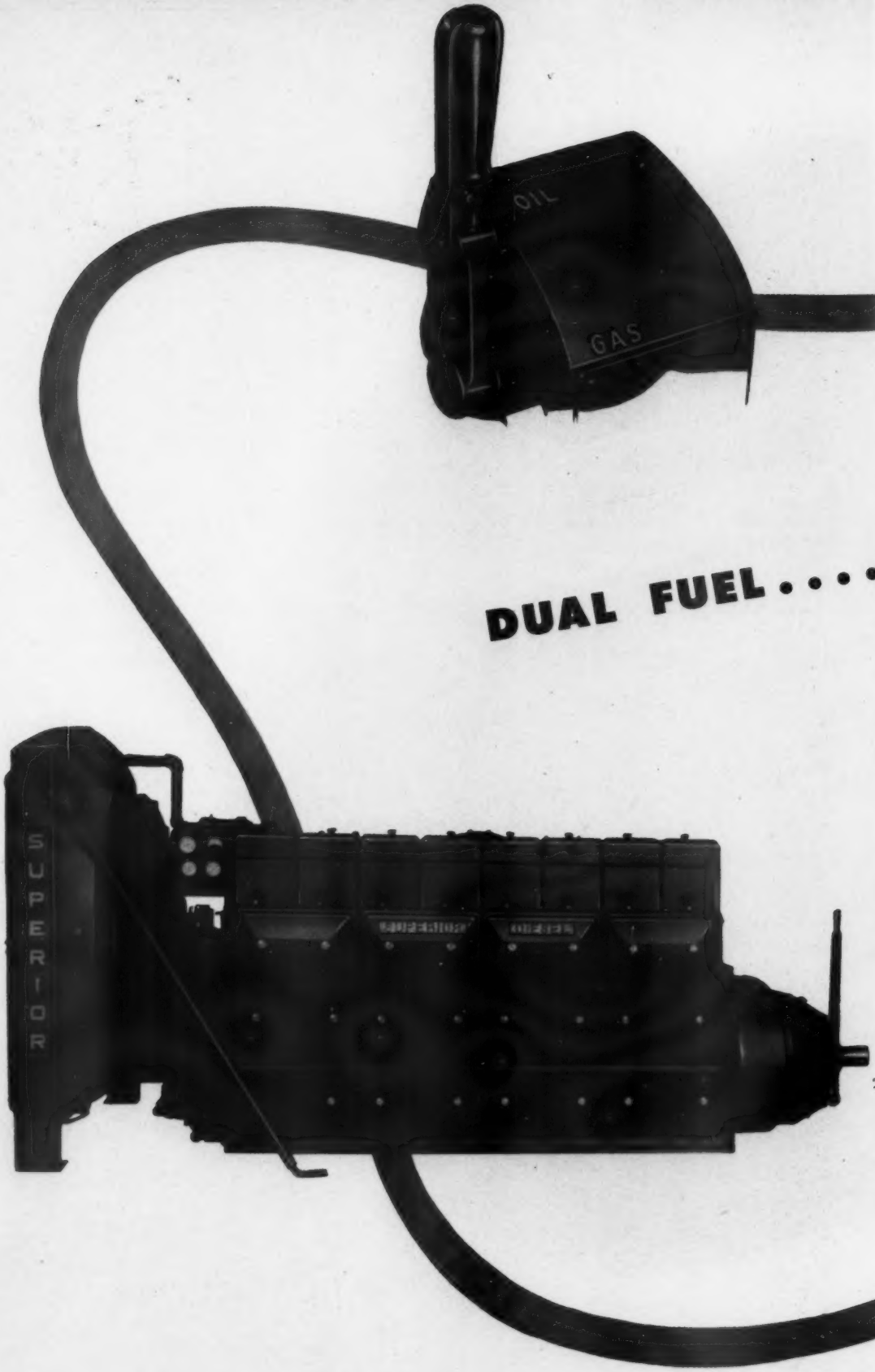
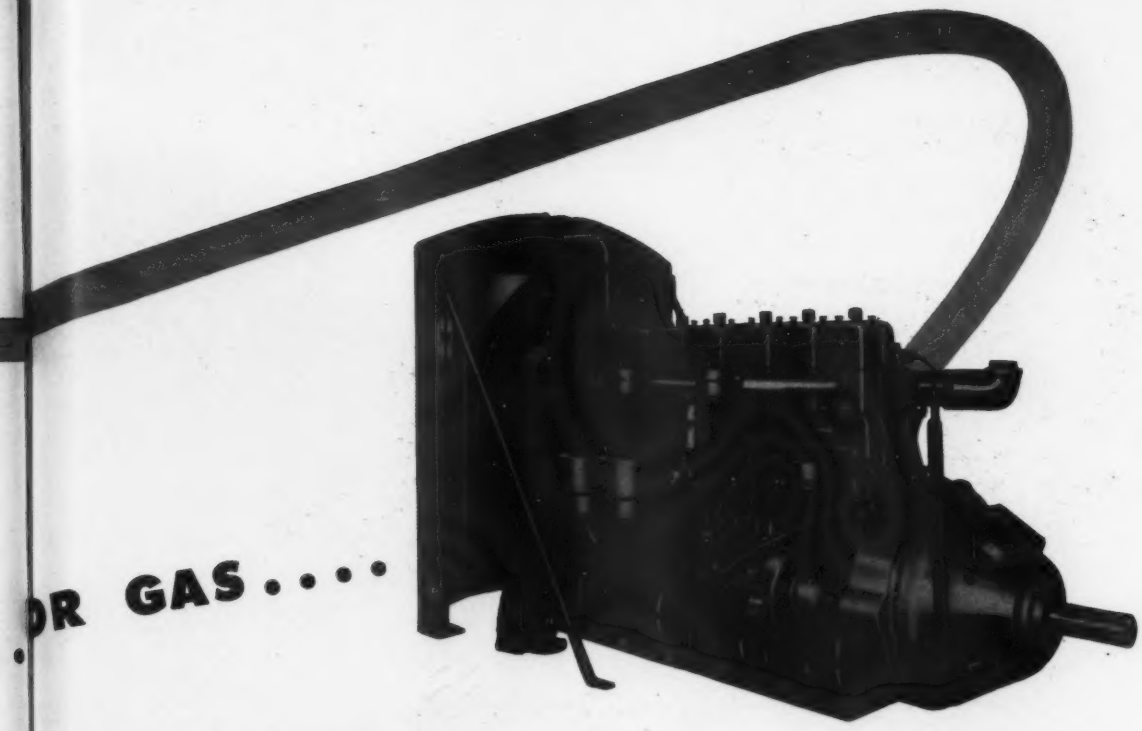


DUAL FUEL . . . . .

OR

NAT

XUM



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The Superior 6G-510 is a gas engine famous wherever drilling is being done. Dependable, conservatively rated, this 300-horsepower Superior is easy to maintain.

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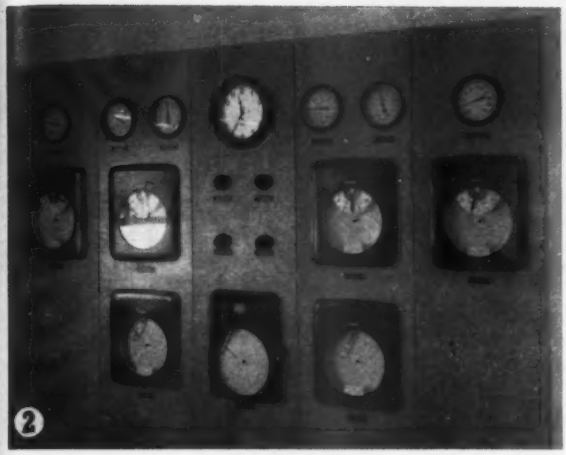


2. PANEL BOARD.—This instrument panel located adjacent to the gager's control board provides records for the gaging operations at the Cushing terminal. The recording instruments are in service on temperature, flow, and pressure. The indicating equipment shows pressure conditions on the various lines operated by the gaging crew.

from the western Permian basin to refining centers in Illinois and the Midwest, and is one of the most modern systems in operation today. At Cushing the southwestern and northwestern sections meet, and the terminal also connects with smaller crude lines owned individually by the four builders of the Basin-Ozark System—Shell Pipe Line Corp., The Texas Pipe Line Co., Sinclair Refining Co., and Cities Service Pipe Line Co.

The Basin Pipe Line System originates near Jal, N. M., and is made up of 20, 22, and 24-in. pipe. It is operated by The Texas Pipe Line Co.

The section from Cushing to Wood River is called the Ozark Pipe Line System, and is operated by Shell Pipe Line Corp. The Wood River-to-Patoka, Ill., section is wholly owned by The Texas Co. but is operated for that company by Shell Pipe Line Corp. The Ozark line has a diameter of 22 in. and generally follows the right-of-way of the original Shell 10-in. line, built more than 30 years ago as the Yarhola pipe line.

This older Shell line, an outgoing line, is not tied in with the remote-switching operations here, but the terminal receives crude from a number of feeder lines in addition to the big Basin line.

Most interesting of these is Shell's new 10-in. line from Elk City, Okla., which can operate up to 14,000 bbl. per day entirely by gravity, without a single pump along its entire 157 miles. (Photo 5.) This is possible because Elk City lies at an elevation of 1,953 ft. above sea level, while Cushing's elevation is 875 ft.

3,000,000-bbl. tank farm.—The 38 tanks of the Cushing terminal range in capacity from 55,000 to 122,000-bbl., and their combined capacity is

(Continued on page 132)

3. VENTURI METER.—Flow of incoming crude oil via the Basin section of the system is measured by this 20-in. venturi meter. The instrument provides information on instantaneous rate and total flow. Two similar instruments are used on outgoing crude oil, one on the Shell line and one on the Ozark line.

4. TRANSFER PUMPS.—Crude oil leaving the Cushing terminal passes through this equipment before being picked up by the pumps in the nearby main-line station. The two large vertical centrifugal pumping units, center background, receive oil from the tank farm and deliver it to the suction of the main-line pumps serving the Ozark 22-in. line. The two smaller pumps on the left operate to supply oil to Shell's 10-in. main-line pumps. Mixing of different crudes is accomplished with the small pump on the extreme right. Line strainers for four of the pumps may be seen in the foreground directly behind the second row of motor-operated valves. Servicing of the equipment is speeded up with overhead hoists.

5. END OF A 157-MILE FREE RIDE.—This scraper trap is on the Cushing end of Shell's 157-mile, 10-in. gravity line from Elk City, Okla.

XUM

Here's the what, when, where, why of Flanges

by O. L. Lewis*

AT present there are seven recognized flange types. There is a reason for the existence of these types and when properly applied each proves highly serviceable, whereas if misapplied unsatisfactory service may result. The seven types of flanges are shown in Fig. 1.

1. Integral flange.—Most valve bodies, flanged fittings, etc., are manufactured with integral flanges. Some manufacturers of valves and special fittings do use welding neck flanges instead of the integral flange to make up their product. However, this method of fabrication is based primarily upon machine setup of the specific manufacturer and not upon any given advantage or disadvantage in the two types of flanges.

The integral flange provides a satisfactory joint equal to that obtained with the butt welding flange and it allows shorter face to face dimensions. It is also usually stronger because its neck is ordinarily heavier than pipe for the same pressure rating.

2. Lap-joint flange.—This type, commonly known as Van-Stone, has two main advantages over other "attached types." The most obvious advantage is that it can be swiveled on the pipe, simplifying lineup of bolt holes. Where piping is subject to some misalignment or required angularity is difficult to obtain, this type flange should definitely be considered.

The other main advantage with this joint is that a pipe-to-pipe contact is obtained which is desirable for piping carrying corrosive material. When the pipe and Van-Stone stubs are alloy material because of corrosive or erosive conditions, the base flanges may be carbon steel since they are not in contact with the corrosive medium. This feature of the lap joint often proves quite economical.

Disadvantages of the lap joint type flange are:

1. Two pieces to warehouse and handle against one for the other types.
2. Higher installed cost.
3. Resistance to torque is entirely dependent upon friction between the contact surfaces which may tend to cause leakage.

3. Threaded flange.—This was the first of the attached flanges to be developed. At the present time its primary application is for repair work in hazardous areas where welding is not allowed, or where field welding impairs the strength of the piping material. This type flange is seldom installed where conditions permit any of the other types to be used.

Screwed flanges may be installed with seal welding to insure against leakage. This practice has some advantage but is not considered entirely satisfactory as a light-seal weld is not normally heavy enough to hold any pressure leaking by the threads. If the seal welds are made heavy enough to take pressure, stresses resulting therefrom will usually loosen the threaded joint so that the equivalent of a slip-on flange with only its hub welded is obtained. This also is not considered a satisfactory joint.

4. Blind flange.—This is the equivalent of a flat head bolted on the pipe. It is used as a closure when a future connection may be needed or for access into the line. It is normally more expensive than a welding cap and has no application outside of an end closure.

5. Slip-on flange.—This is one of the two most popular companion

*Consulting engineer, Tulsa.

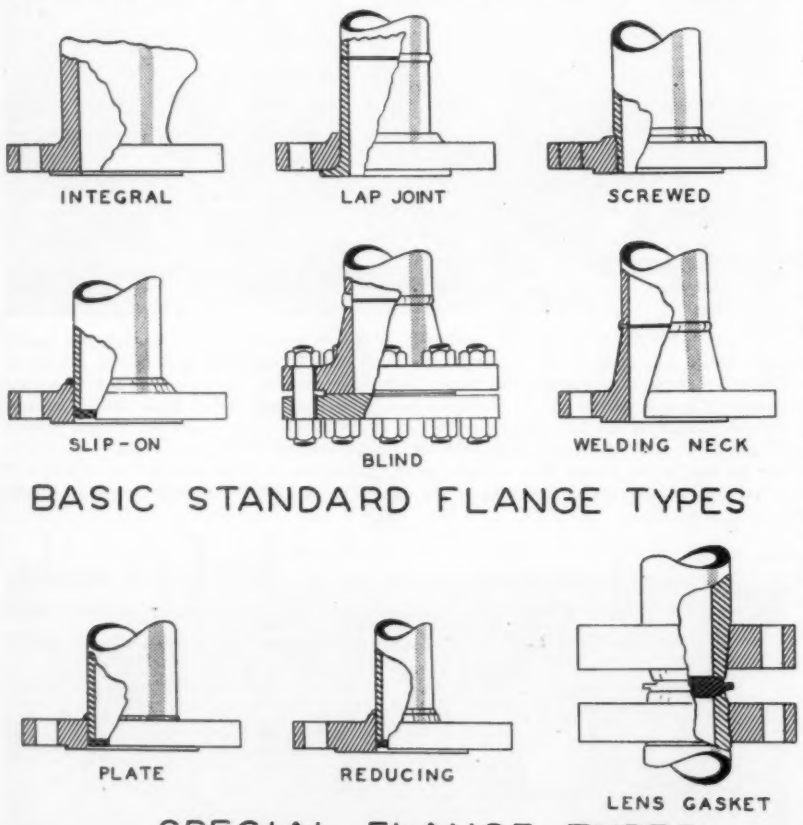
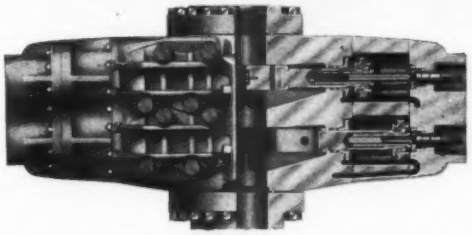


Fig. 1

In cellar control gate equipment . . .

ONLY SHAFFER GIVES YOU BOTH

Hydraulic OPERATION



Shaffer Hydraulic Cellar Control Gates

If your operations call for *hydraulically*-operated cellar control gates, the Shaffer Hydraulic Cellar Control Gate is, by all standards, the most advanced, most dependable, most compact hydraulic cellar control gate available today. These are only a few of its many outstanding advancements . . .

▸ SPACE-SAVING COMPACTNESS: In the Shaffer Hydraulic Cellar Control Gate you get TWO separate ram compartments unitized in ONE body—*with a total overall height of only 30" even in sizes as large as 13⅜" (12" Series 900)!*

▸ COMPLETELY ENCLOSED DESIGN: Note how all moving parts are completely enclosed within the gate body—nothing to become damaged or wedged by objects falling into the cellar—nothing to become corroded by chemicals or salt-laden muds. Even the locking shaft is non-rising—fully protected!

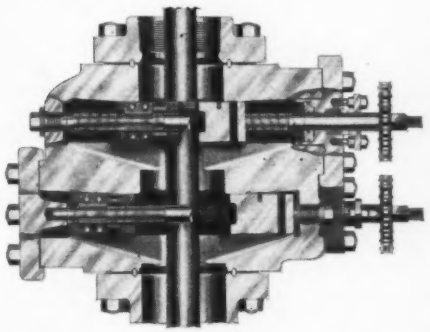
▸ FAST, SIMPLE RAM CHANGES—the simplest in *any* gate. Merely unbolt and swing open the side door, slide out the ram assembly, slide in the new assembly, close and bolt the door—and the job is done. *Moreover, complete ram changes can be made whether pipe is in or out of the hole!*

▸ DIRECT HYDRAULIC DRIVE with the hydraulic operating cylinders *directly behind* the rams. No secondary connections between hydraulic cylinders and rams—greater safety, maximum simplicity.

▸ QUICK DRAINING BODY: The rams travel on high narrow guide ribs far above the steeply-sloped compartment bottoms. Mud and sand quickly drain back into the well and no detrimental accumulations can collect to prevent free and complete ram travel!

The above advancements are vitally important—yet are only part of the COMPLETE *story on Shaffer Hydraulic Cellar Control Gates. Be sure to get* ALL *the facts from your Shaffer representative—or write direct!*

Mechanical OPERATION



Shaffer Double Cellar Control Gates

If your operations call for *mechanically*-operated cellar control gates, the Shaffer Double Cellar Control Gate is unequalled in this field. Maximum compactness, rugged dependability and installation simplicity are assured by such exclusive features as these . . .

▸ UNUSUAL COMPACTNESS: Although Shaffer Double Cellar Control Gates combine TWO complete ram compartments in ONE compact body, *they require less than 29" of cellar height even for sizes as large as 13⅜" (12" Series 900)!*

▸ WIDE CHOICE OF POWER: Shaffer Double Cellar Control Gates can be readily operated with air, steam or electric drive—all with the added protection of complete manual standby. Moreover, the same gate can be quickly changed from one type of power to another to fit the requirements of different rigs.

▸ SIMPLE RAM CHANGES: Only *one* end cover need be removed to completely change the rams in the compartment of a Shaffer Double Cellar Control Gate. The complete ram assembly slides out in one unit, facilitating ram changes and eliminating extra operations.

▸ SELF DRAINING BODY: The compartment bottoms in Shaffer Double Cellar Control Gates feature the same quick draining design as Shaffer Hydraulic Cellar Control Gates. Rams travel on high narrow guide ribs where no detrimental sand or mud accumulations can collect to interfere with free ram travel. Any mud or sand that does get into the compartment quickly drains back out again into the well, reducing maintenance to a minimum.

There are many other important operating features built into Shaffer Double Cellar Control Gates and your Shaffer representative will be glad to give you the complete details.

HERE'S AN ADDED SAVING! Not only are Shaffer Cellar Control Gates—whether hydraulically or mechanically-operated—the most advanced in their respective fields, but if you use *both* types in your field operations there is no need to stock separate ram blocks and ram rubbers for each type of gate. Ram Rubbers and Ram Blocks are interchangeable, size for size, between the hydraulically-operated and mechanically-operated Shaffer Cellar Control Gates. You save on inventory, minimize delays, simplify shipping and stock-room requirements.

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See pages 4433 to 4496 of your 1950 Composite Catalog for helpful data on the above equipment as well as on other Shaffer products.

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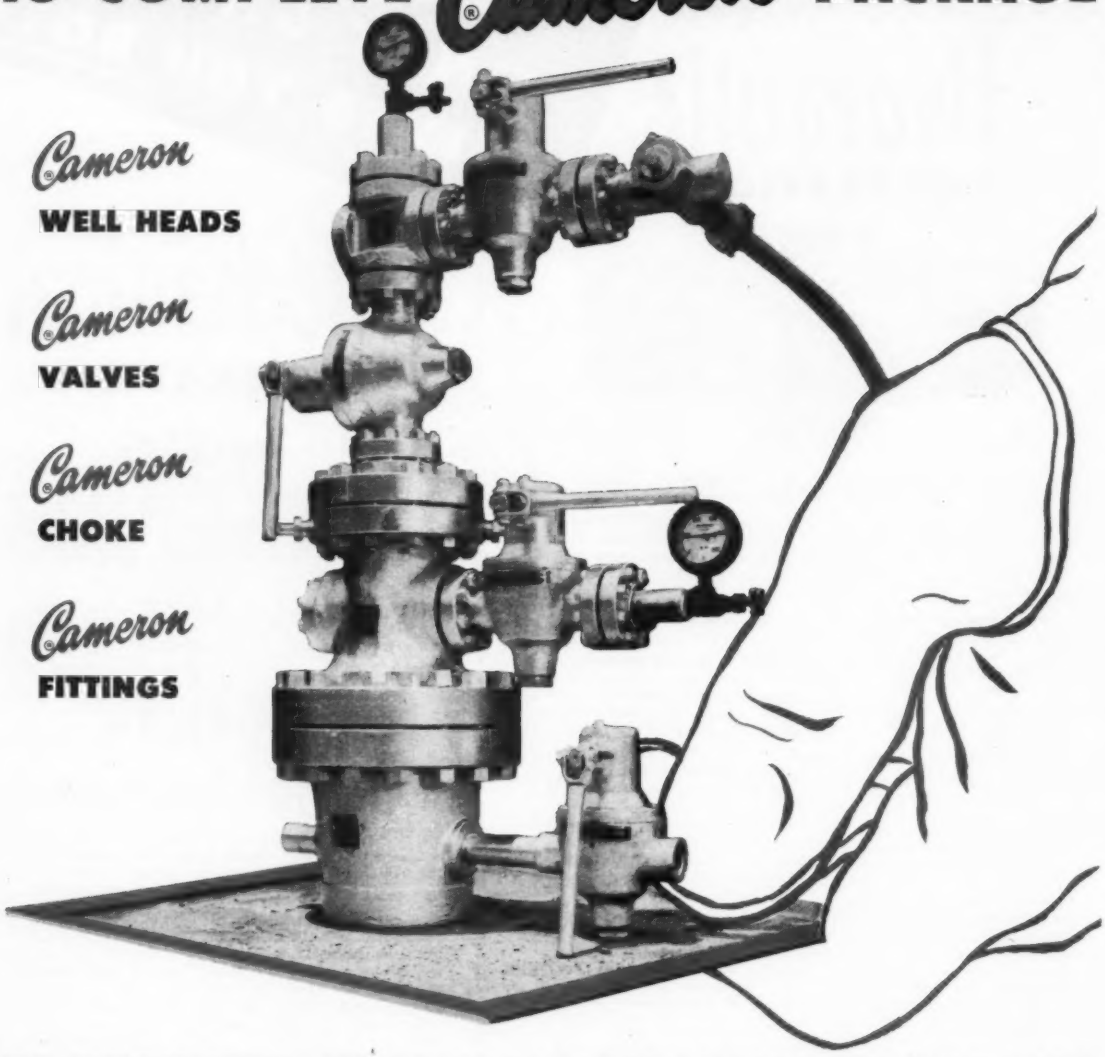

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Instead of assembling several different makes of valves, chokes and fittings in a well head manifold, thus dividing the responsibility of proper functioning and servicing of the various units among a number of manufacturers, many operators have welcomed the idea of the all-Cameron Christmas tree.

Furthermore, Cameron offers the operator the widest selection of well completion equipment, including various types of casing hangers, numerous methods of tubing suspension, both ram type and lock-screw type tubing heads, non-lubricated lift-plug valves, integrated flow wings, convertible positive-adjustable chokes, and all types of fittings.

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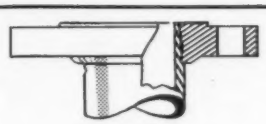
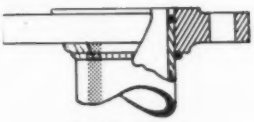


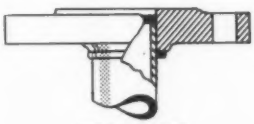
SCREWED

Use where flanged connection is required on 1½-in. and smaller within 150 and 300-lb. A.S.A. ratings. Should be seal welded for services over 500 psi. or 600° F. Also applicable where pipe or flange material is not suitable for welding.



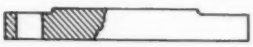
SLIP-ON

Use only within 150 and 300-lb. A.S.A. ratings where space does not permit butt-welding type.



REDUCING

Use only where change in line size is necessary in minimum space, line not subject to high external stress, and flow characteristic not critical.



BLIND

Use for end closure for line where cleanout or future connection anticipated. (More expensive than weld cap).

LAP JOINT

Use where rotational alignment of bolt holes on fixed flange would be difficult and pipe is fixed to prevent excessive bending stress in joint. Should not be used on large or thin-walled pipe.

WELD NECK

Preferred for all severe service conditions up through A.S.A. 2,500-lb. standard where pressure, temperature, shock, vibration, or external stress is high. Generally the most economical installed cost.

Fig. 2—Normal application for and limitations of standard flange types.

flanges. It is now included in the A.S.A. standard B16e in 150 and 300-lb. classes.

The main advantages of this type flange are:

1. Easier alignment for welding.
2. Lighter weight.
3. Shorter face-to-face makeup dimension on fabricated assemblies.

Major disadvantages of the slip-on flange are:

1. Two fillet welds instead of one butt weld. (Generally it is easier to ascertain that a butt weld is sound than it is to ascertain that a fillet weld is sound.)
2. Produces higher bending stresses in the pipe wall.
3. Reduces fatigue life of the joint. (Fatigue failure will usually occur at the base of the fillet weld in about one-half the time required for failure in an equivalent butt-welded joint. This is only a factor where piping is subject to vibration or cyclic stresses of any kind.)
4. Possible warping in the flange face due to heat of welding and unequal cooling particularly on large sizes.

6. Reducing flange.—This is normally of the slip-on type, though it may be obtained in butt-welding type on special order. It is subject to the same advantages and disadvantages of any slip-on flange. The moment on the fillet weld is increased as the size of pipe is decreased relative to the flange diameter. This factor may lead to high stress concentration in the pipe adjacent to the joint and is considered one of the major disadvantages of reducing flanges as compared to other methods of line size reduction. The abrupt reduction in line size also affects flow characteristics, increasing turbulence. Reducing flanges carry the same pressure-temperature rating as slip-on flanges but they should be used with caution for the reasons mentioned.

7. Welding neck flange.—This type is rated by A.S.A. from 150 through 2,500 lb. and in sizes from ½ in. through 24 in. At the present time this is by far the most popular type of flange. About the only points in which other flange types lead are ease of alignment and shorter possible face-to-face dimensions on fabricated assemblies. Ease of alignment is apparently not critical as a study of installed costs, including material and labor, show that the welding-neck type may be installed cheaper even though the cost of flange itself is greater. This means that the other factors including labor are appreciably less for the welding-neck flange, offsetting flange price and still giving the most economical installation. The butt weld is much better suited to cyclic loadings and high bending loads than the fillet weld.

Stress in welding-neck flanges is approximately 20 per cent less than any of the other types with identical loading. This means a greater margin of safety against leakage and greater resistance to dishing due to excessive bolt loads. One manufacturer claims that the controlling stress in welding-neck flanges is in the order of 50 per cent of that in slip-on flanges; the figure varies with flange size and rating.

Special flange types have been developed for particular applications outside of standard types range and where unusual design conditions were encountered. These flanges for the most part to date have not received wide enough application to be considered standard.

A special flange type widely used by one manufacturer is a basic butt welding flange using a C-clamp ar-

(Continued on page 135)

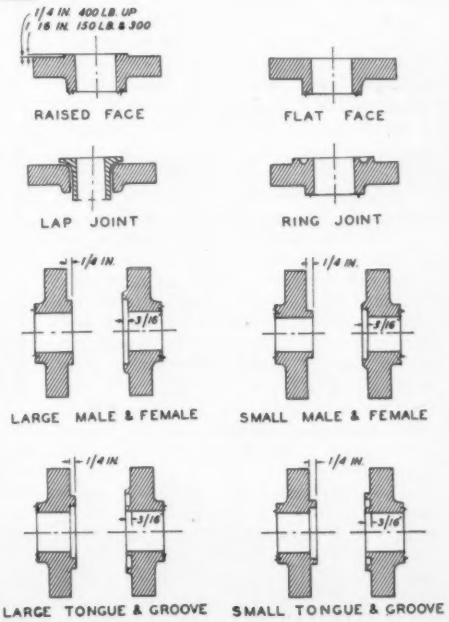


Fig. 3—Common flange facings.

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ISOSYNTHESIS PROCESS

WORK on the isosynthesis process to the present has been laboratory-scale research on kinds of catalysts which promote the formation of isoparaffins, particularly isobutane and isobutene. This study of hydrogenation of carbon monoxide developed from other methods of producing hydrocarbon compounds by catalytic high-pressure synthesis. These methods, however, produce primarily straight-chain saturates with only a small percentage of the isocompounds.

Experiments were carried out at pressures of 1,000 atm. in some instances. All equipment used was designed for extremely high pressures and lined with materials such as copper which would not form carbonyls with carbon compounds, as would some primarily iron materials.

Water gas, a mixture of about 40 per cent carbon monoxide and 50 per cent hydrogen with minor amounts of carbon dioxide and hydrogen, will, when subjected to rather high temperatures and a pressure of 30 atm., form carbon, carbon dioxide, and lower hydrocarbons, particularly methane.

Use of catalysts as in this synthesis has been tried previously. Catalysts of the iron group of the periodic table when used with water gas yield carbon and methane. Water gas in a copper-lined reaction tube with an alkylized zinc catalyst yields very small quantities of hydrocarbons, and an aluminum-oxide catalyst will yield a considerable quantity of hydrocarbons, but still a minor amount of the isocompounds.

Thorium Oxide Best Single Catalyst

Different results, however, were obtained when thorium oxide was used as the catalyst. Isobutane is one of the principal reaction products, branched liquid hydrocarbons are yielded in quantity, and almost no straight-chain products are produced. The reaction tube for this synthesis could not be made of ordinary iron because of lack of strength and undesirable conversions of the carbon and hydrogen. Some special steels, and copper-lined tubes worked well, however.

The thorium-oxide catalysts were best prepared by precipitation from dilute salt solutions. This procedure allowed very wide control of catalyst character, particularly of settled density, which could be varied from 0.7 to 2.3, depending on the kind of precipitation and preliminary treatment used. Normally the thorium oxide is prepared by precipitation from a nitrate solution with sodium carbonate. The higher the concentration of the nitrate solution, the lower the settled density of the thorium precipitate. Sintering the catalyst before it is used will give a greater concentration since the heating operation drives off water and carbon dioxide which is precipitated with the thorium oxide.

The thorium catalysts were found to be very long lived under conditions used in the experiments. Regeneration of the catalysts was possible with air, after a considerable length of operation, without adversely affecting their activity.

Experimentation mostly was car-

GERMANS DEVELOPED METHOD FOR PRODUCING ISOPARAFFINS

THIS article describes a new "isosynthesis" process. The original paper was made available to The Oil and Gas Journal by The Texas Co., in the form of a translation from German, of the original published reports.* Isosynthesis produces isoparaffins, as compared with the predominantly straight-chain paraffin product of the Fischer-Tropsch process and its American variations.

The subject may have very important possibilities for the future, assuming that American engineering can do for this what it did for Fischer-Tropsch.

The following statements are quoted from the introduction in the original paper on isosynthesis.

"Requirements which must be met by a high-quality gasoline, particularly aviation gasoline, are of a varied nature. For attainment of highest possible engine output, a good high-compression characteristic and accordingly a high octane number, a satisfactory supercharging curve relationship, and a high lead susceptibility are needed. The highest specifications are met by the isoparaffinic hydrocarbons, and the more compact their molecular structure as a result of the presence of tertiary or preferably quaternary carbon atoms, the greater their resistance to compression.

"The products isobutene and isobutane are important sources of high-grade aviation gasoline. The former can be converted by polymerization and subsequent hydrogenation; the latter by alkylation (for example) with n-butylene to isooctane, which is specially in demand as an airplane fuel.

"The available methods for the preparation of isoparaffinic hydrocarbons, aside from certain organic preparations and the polymerization olefins, are catalytic isomerization or the cracking of normal paraffins in the presence of aluminum halides.

"No process which is based on coal or its gasification products, and in which isoparaffins directly result as the main products suitable for the preparation of aviation fuels, had before this been found. The investigations discussed in the present paper, in which the initiative was taken by F. Fischer in 1940 in connection with research on the synthetic preparation of aromatic hydrocarbons, have to do with this problem. The result of the investigation is a new synthesis, to which the name 'isosynthesis' has been given.

"Isosynthesis requires, as do the syntheses of the normal paraffins, carbon monoxide and hydrogen as the charging stock, but in contrast to the known hydrocarbon synthesis employing cobalt or iron catalysts, other contact agents must be used, namely certain oxides, and in particular thorium oxide, and considerably higher reaction temperatures and pressures. Correspondingly, the course of the reaction is also fundamentally different. This synthesis was first made known in 1943 by Frank Fischer in a report entitled, "A Summary of the Syntheses from Carbon Monoxide and Hydrogen."

The following summarization of the isosynthesis paper has been prepared by the engineering editorial staff of The Oil and Gas Journal.

*High-Pressure Hydrogenation of Carbon Monoxide to Predominantly Isoparaffinic Hydrocarbons (Isosynthesis"), by Helmut Pichler and Karl-Heinz Ziesecke (Kaiser-Wilhelm-Institut fur Kohlenforschung, Mulheim a.d. Ruhr). Published in "Brennstoff-Chemie," January 13, 1949, issue, pp. 13-21.

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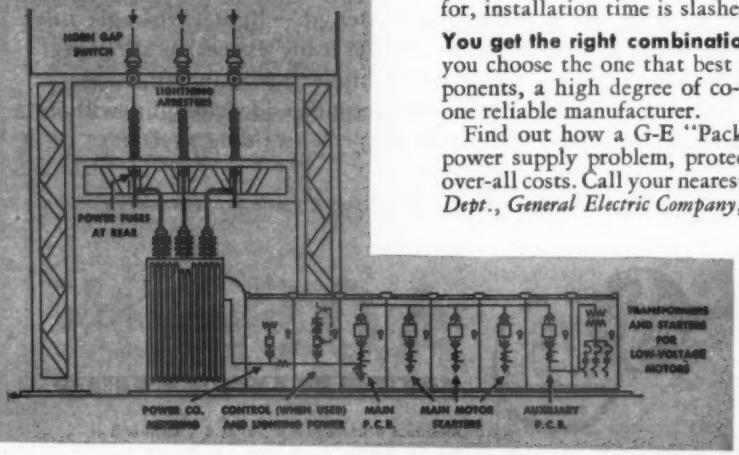

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ried on with a CO to H_2 ratio of 1.2 to 1. High proportions of CO favor the formation of carbon, while larger amounts of H_2 increase the amount of gaseous hydrocarbons formed.

Results of Single Catalyst Tests

Of all the catalysts tried, including oxides of tungsten, chromium, titanium, beryllium, ceriu, uranium, manganese, magnesium, and others, only the thorium oxide converted appreciable amount of the CO-H_2 mixture to isocompounds. Results of testing with four of these oxides are shown in Table 1.

The success of the thorium-oxide catalyst led to more intensive investigation of that substance. Fig. 1 shows the composition of the product resulting from synthesizing normal water gas under a pressure of 150 atm. and at varying temperatures. The desirable isosynthesis temperature range is shown by this chart to be between about 375° and 500° C. A temperature of 450° C. was found to be the most favorable. The temperature limits were determined by the catalyst, operating pressure, and by the length of time the gases remain within the reaction space.

Tests with the thorium-oxide catalyst at 450° C. and at varying pressures show that optimum conversion conditions prevail at between 300 and 600 atm. (see Fig. 2). At lower pressures the conversion is too low and at higher pressures there is an undesirable amount of methane and dimethyl ether formed.

Further experimentation was done with varied throughput of water gas and with varied length of time of throughput for a fixed quantity of gas. The results show that increase of pressure has much more effect on the amount of conversion than does increase in length of time of contact.

Experiments on the effect of staging and cycling of the gas with intermediate removal of reaction product test pressures of 150 atm. and —25° C. showed that there is a larger H_2 consumption in relation to CO, and a larger production of "reaction water" with both methods of operation. Of course, larger amounts of the feed gas were converted by both methods.

TABLE 1—BEHAVIOR OF DIFFERENT CATALYSTS, WITH SPECIAL REFERENCE TO THE ISO-C_4 HYDROCARBONS

Catalyst	Volume per cent of gas converted	Iso-C_4 (as gr. per standard m^3 pure gas)	Per cent iso-C_4 of total C_4 frac.	Oil plus gasoline (as gr. per standard m^3 pure gas)
ThO_2	46	16	88	40
ZrO_2	32	9	82	..
CeO_2	10	1.3	81	..
Al_2O_3	53	2.8	59	5

TABLE 2—CATALYTIC EFFECT OF ThO_2, Al_2O_3, AND ALKALI (450° C., 300 Atm.)

		Yields in g./standard m^3 CO + H_2 mixture							
		% conversion	Liq. hydroc.	Alcohols: In oil	Alcohols: In H_2O	i-C_4	n-C_4	C_3	C_2	C_1
1.	Al_2O_3 (from aluminate)	24	14	0.7	..	10	6	4	0	9
2.	Al_2O_3 + 3% K_2CO_3	25	24	<1	<1	2	1	0	8	14
3.	ThO_2	62	42	9	11	23	3	11	4	11
4.	ThO_2 + 0.6% K_2CO_3	62	65	21	5	12	1	8	1	6
5.	ThO_2 + 20% Al_2O_3	73	34	1	2	61	9	9	10	15
6.	ThO_2 + 20% Al_2O_3 + 3% K_2CO_3, basis Al_2O_3	78	25	0	0	85	10	0	7	22
7.	ThO_2 + 0.6% K_2CO_3 (basis ThO_2) + 20% Al_2O_3	70	42	2	4	51	7	18	6	12

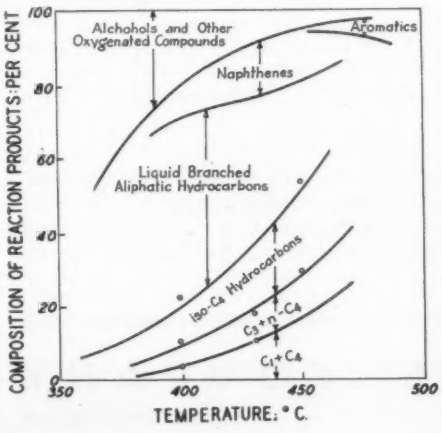
TABLE 3—TESTS WITH ThO_2-ZnO CATALYSTS (450° C., 300 Atm.)

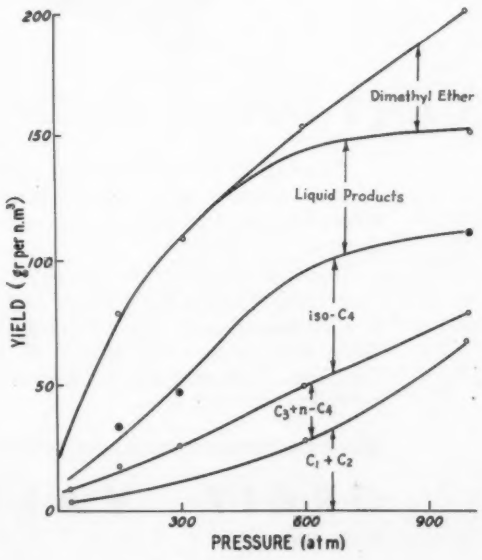
No.	Catalyst compos. in %—	CO:H_2 ratio	CO conversion (%)	H_2 conversion (%)	Yields g/standard m^3 CO-H_2 mixture: Liq. hydroc.	Alcohols: In oil	Alcohols: In H_2O	i-C_4 hydroc.	C_3 + n-C_4	C_2	C_1	Liq. prod. + liq. gas, g/m^3 CO + H_2
1.	100 ZnO	41:49	38	41	0	6.9	23.1	1.9	1.4	2.0	51	33.3
2.	75 ThO_2-25 ZnO	40:50	74	55	50.3	6.0	8.9	26.9	21.8	6.1	10.3	113.9
3.	75 ThO_2-25 ZnO	40:50	74	61	39.7	7.1	6.8	28.5	31.7	18.0	10.5	113.8
*4.	75 ThO_2-25 ZnO	48:42	64	65	57.7	2.5	1.9	16.0	18.0	12.1	21.5	96.1
*5.	87 ThO_2-13 ZnO	48:42	58	60	46.2	4.8	1.6	22.4	21.9	5.6	10.6	96.9
6.	75 ThO_2-25 ZnO	48:42	77	69	78.7	2.6	5.8	19.3	21.8	4.6	9.9	128.2

*Tests at 150 atm.

Fig. 1—(Below) Composition of reaction products as dependent on temperature when using a ThO single component catalyst.

Fig. 2—(Right) Influence of pressure on quantity and quality of reaction products of isosynthesis (ThO_2 single-component catalyst 450° C.)





was made with catalysts composed of two or more substances.

Among the substances tried were alkalies (that in the synthesis of alcohols favor the formation of alcohols of high carbon number) and phosphoric acid (which influences the conversion of unsaturates to higher branched hydrocarbons). On the theory that alcohols are first formed in isosynthesis and with hydrogen, and oxygen later removed in the form of water, substances which favor the formation of alcohols

(Con't. on page 107)

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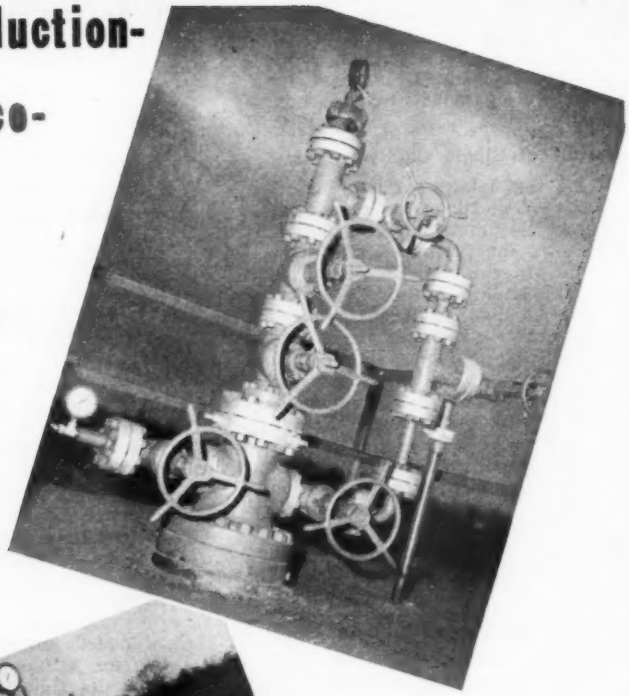

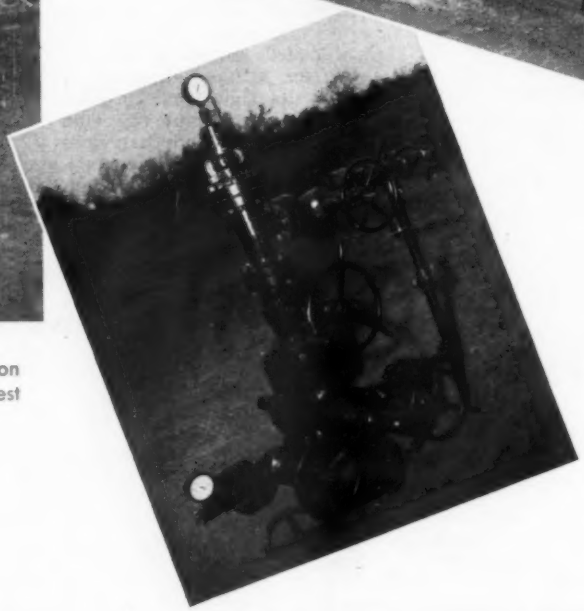

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The Fundamentals of

GALVANIC CORROSION

by A. B. Lauderbaugh*

SOME fundamentals of galvanic corrosion will be presented here. For the most part they will be illustrations from common, everyday applications in the oil and gas industry, of the principle of the electric cell discovered by Luigi Galvani, and developed and explained by Volta. This primer is based on a series of colored slides developed more than 2 years ago by the corrosion department of Manufacturers Light & Heat Co., one of the associated companies of the Pittsburgh Group Companies of the Columbia Gas System. During the past 2 years, this primer has been used throughout the group as part of an employe education plan.

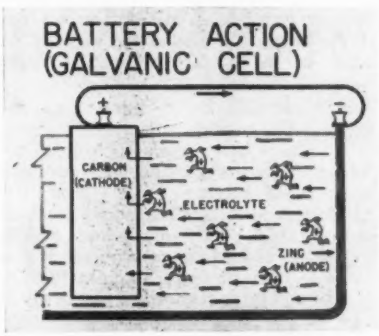

Fig. 1. BATTERY ACTION (Galvanic Cell).—Did you know that every time you used a flashlight, you were making practical application of a galvanic cell? There is probably no more common example of the principle of this cell than the ordinary flashlight battery.

The behavior of a flash-light dry cell is analogous to the galvanic cells found along a pipe line. The electricity that lights the filament is a result of placing two dissimilar metals, carbon and zinc, in an electrolyte, and connecting them externally with a wire. In producing the current, zinc, the anode, is corroded. It is certain that many people have had the experience of having the outer shell of a dry battery break through in a pit hole after continued use. In a like manner, the wall of a buried pipe line may corrode through in a pit hole when the pipe, or a portion of it, is the anode of a galvanic cell.

Presume, for the moment, that there

*Chief gas engineer, Manufacturers Light & Heat Co., Pittsburgh. Presented at Canadian Gas Association, Murray Bay, Quebec, June 20-23, 1950.

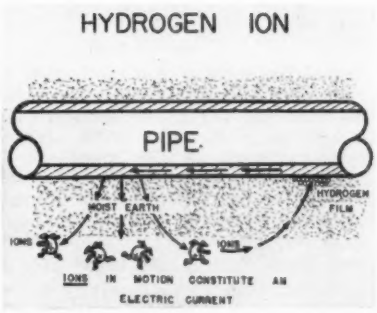

Fig. 2

is a galvanic cell at some point on a pipe line, and see what the corresponding parts of the cell are (Fig. 2). The moist earth becomes the electrolyte. Two areas on the surface of the pipe are the two electrodes, and the pipe wall becomes the wire that completes the circuit. Where the current leaves the pipe, the anode area, the pipe will be corroded. Where it returns to the pipe, the cathode area, a thin film of hydrogen will be deposited on the surface of the pipe.

The film of hydrogen, if it remains on the surface of the cathode, acts as an insulator and tends to stop the flow of the galvanic current. The same film of hydrogen forms on the carbon electrode of the dry battery. For the battery manufacturer, getting rid of this film of hydrogen has been a difficult problem. Because battery manufacturers have done an excellent job in solving the flash-light-battery polarization problem, it is now possible to use a flashlight continuously for a number of hours without having it grow dimmer and dimmer, till it is little more than a "glow worm."

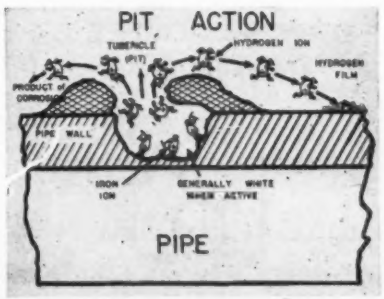

Fig. 3

A closeup of the anode (Fig. 3) will show in more detail what is happening to the pipe metal. With the cell in operation, the flowing particle of iron, called an iron ion, leaves the pipe wall and goes into solution in the soil water. It is exchanged at once for a hydrogen ion, leaving the iron behind as a rusty tubercle around the pit area. Sometimes this barnacle-like scab will "seal off" the pit to the extent that the ions (electric current) can not get through, and the cell becomes inactive so long as the tubercle is not disturbed.

Galvani's original cell was the result of using dissimilar metals, so let's look for some of these dissimilarities in our gas piping systems. (Fig. 4.) Probably the first example

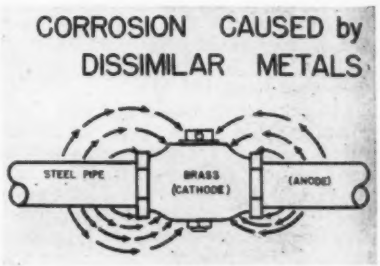

Fig. 4

to come to mind will be a brass core, or an all-brass stop, in a steel service line. In this cell the brass will be the cathode, and the pipe, the anode. Current will flow from the service line through the soil to the brass stop or core, returning through the metal to the anode area.

Where current leaves the pipe it will carry metal with it. It is fortunate in this case that the area of the brass core, or stop, is small with respect to the steel pipe surface. The current requirements of the small area cathode will be supplied from a relatively large-area anode, and the corrosion should not be severe.

People also have wondered why, after renewing a short section of line, the new piece of pipe seemed to corrode even faster than the original. (Fig. 5.) One of the more prevalent and least-considered galvanic cells due to dissimilarity of metals, is created by installing a piece of new pipe in an old line. The new steel pipe will always be the anode of a galvanic cell, created by mechanically

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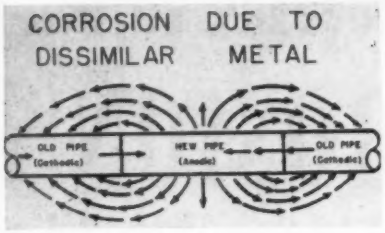

Fig. 5

connecting the old and new lines. Here the ratio of anode to cathode area may be completely reversed from that produced by having a brass stop in a steel line.

If a very short piece of new pipe is installed in an old line, the corrosion may be accelerated, because the small anode will be required to supply current to satisfy the much larger cathode area of the old pipe. Of course, it is not the metal in the pipe wall, but rather the surface metal, rusty steel, that provides the dissimilarity of metals producing this galvanic cell.

Another problem.—Have you ever laid a new line alongside an old line, and connected the two with crossovers or headers? If you have, then you have created a galvanic cell that can be very damaging to the new line. Except for the ratio of surface areas, it is exactly the same sort of cell as that produced by installing new pipe in an old line.

I have recently heard gas men complaining that steel pipe manufactured about 5 years ago was not as good as pipe purchased 20 years ago. As proof, they cited the fact that a line 4 years old was developing pithole leaks, more leaks, in fact, than the old line has ever had. Yet the new line had been laid in the same right-of-way, through the same soil, and parallel to the old line installed about 15 years ago. What actually happened was the creation of a continuous galvanic cell extending along the parallel lines with the new line as the anode. Installing insulating flanges on the crossover connections between these two line has broken the external electric path and stopped the formation of pit holes.

The same sort of metallic dissimilarities may occur between an imbedded piece of black oxide and the

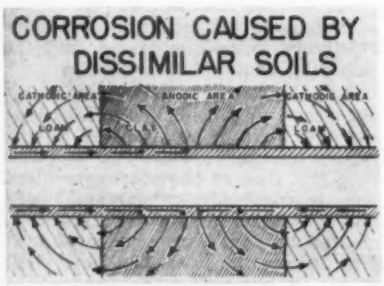

Fig. 6

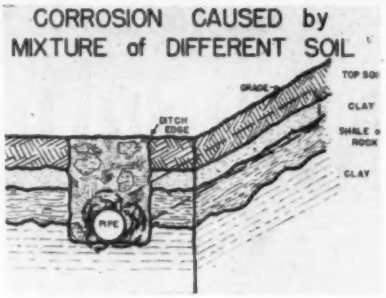

Fig. 7

rest of the surface of a piece of steel pipe; or it may be between the possibly different metallic surfaces of such things as followers, bolts, center rings, or couplings. In each case, it is the anode, the surface from which current is passing into the ground, which will corrode. If the anode area is small with respect to the cathode area, the corrosion can be severe.

So far, we have spoken only of the galvanic cells produced by dissimilarity of metals. The physicist, Volta, demonstrated that many other dissimilarities, (Fig. 6) among them, dissimilarity of electrolyte, would result in a flow of electricity. This difference in electrolyte we find in our business as dissimilarity of soils.

In the Appalachian area, clay soils are, almost without exception, anodic to other soils. That is to say, that portion of the pipe in contact with clay will form the anode of a galvanic cell and will corrode. This diagram represents the idealized condition. In normal pipe-line operation, it may be found where the line crosses a small swampy area, the anode, while the line on either side passes through loam or perhaps shale.

In practice, the galvanic cells caused by dissimilarity of soil are more apt to be the result of mixing the dirt from the spoil bank formed when the ditch was dug (Fig. 7). Large clods of dirt, originially from various depths in the ditch, may rest directly against the pipe after the dirt is backfilled. Such a condition is particularly likely to occur when the ditch is dug by hand. Where clods of clay touch the pipe, the tendency is for that area to become the anode of a galvanic cell, and remember—it's

Fig. 8

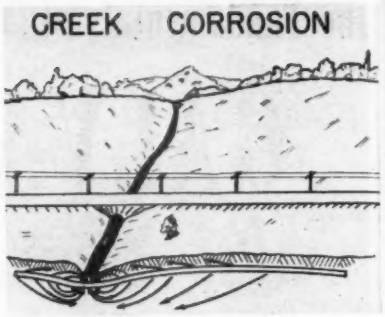

Fig. 9

the anode that corrodes. Machine ditching usually results in a thoroughly mixed spoil bank producing a great number of small cells having a tendency to neutralize each other, resulting in a slow corrosion rate.

Have you ever had to replace a section of pipe because a strip on the bottom about 2 in. wide looked more like a sieve than part of a pipe line? (Fig. 8.) The greatest dissimilarity, and therefore one of the most dangerous conditions, is likely to occur when a narrow strip on the bottom of the pipe rests on heavy, moist, undisturbed ground at the bottom of the ditch, while the rest of the circumference is in contact with the drier backfill.

Cells having their anode and cathode areas around the circumference of the pipe are often spoken of as "short path cells," and can produce very rapid pitting. Once again, the ratio of anode and cathode areas is unfavorable. The small-area anode, 2 or 3 in. wide, is supplying all of the cathode current requirements for the rest of the pipe circumference. This is one of the conditions that can produce rapid and severe pitting along that narrow strip on the bottom of the pipe.

Another variation of this type of cell (Fig. 9) is found where the pipe line crosses small streams or drainage ditches. The soil around the pipe in the bottom of the ditch will be wet and heavy, while that on the banks on either side of the ditch

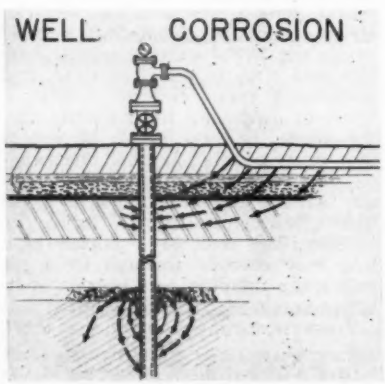

Fig. 10

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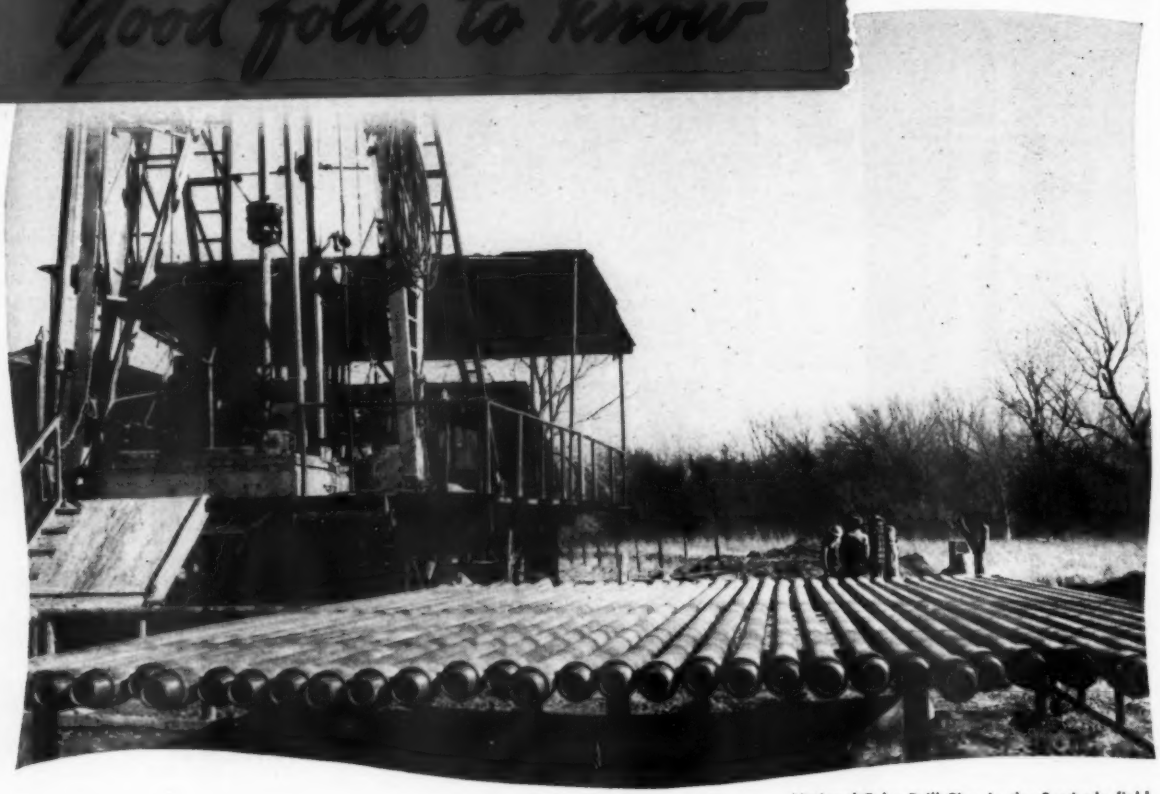

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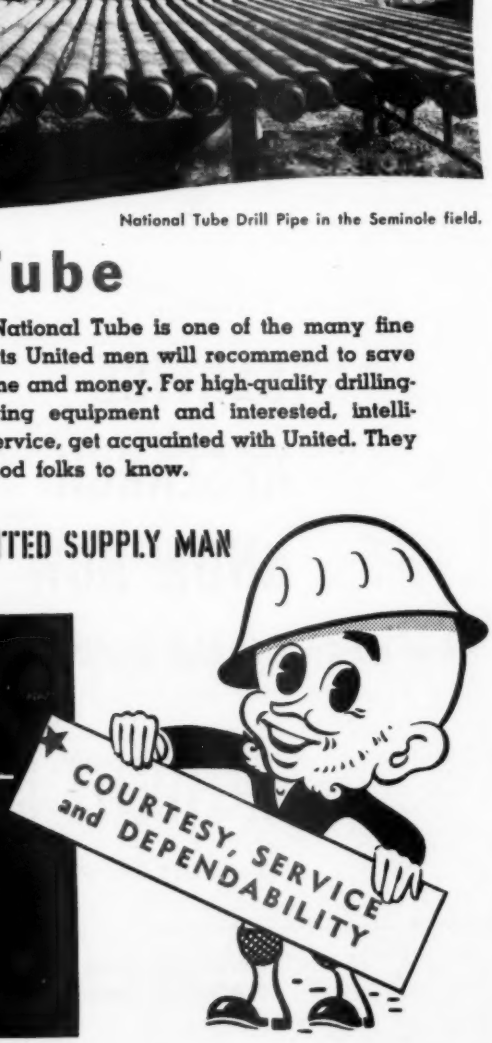

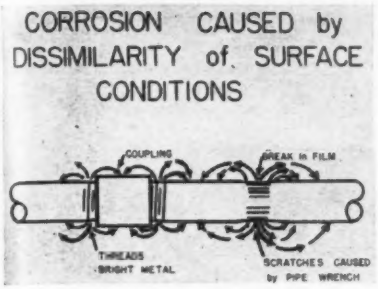

Fig. 11

will be dry and well aerated. The wet ditch may be the cathode of this galvanic cell, and since it is small in area with respect to the rest of the pipe line, the corrosion should not be severe.

Nor are production properties exempt from the possibility of having galvanic cells (Fig. 10). Differences in soil between the well line, where it dips into the ground near the well, and the casing of the well, a few feet below the surface, may easily produce the necessary combination to form a galvanic cell. In the diagram the well line is indicated as the anode and likely to corrode. There are perhaps just as many cases where the well line will be the cathode, and some point along the casing the anode. In the same manner, differences in soil exist at various levels throughout the depth of the well, and can be the factors providing the necessary dissimilarity for active galvanic cells.

How many times have you had to repair or replace a section of screw coupled line (Fig. 11), because it had developed bad pit holes, either right alongside, or just a few inches out from the fitting? The chances are that the pit hole was the anode of a galvanic cell created by a dissimilarity of surface conditions. The scratches made by using a pipe wrench, or the bright surface of the shallow threads adjacent to a fitting, will be anodic to the rest of the pipe. Because their relative area is small, such anodes are often extremely active.

Most street railways operate with a single-wire trolley, using the rails as the current return path to the

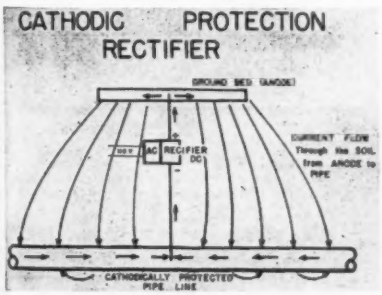

Fig. 12

electric substation. Gas companies have long recognized that in certain areas near the substations they could expect to have trouble with corrosion, unless the proper precautions were taken to drain the so-called "stray current" off the gas line. These "hot spots" were "positive areas," that is to say, the current was leaving the pipe line to take the path of least resistance back to the generator in the substation.

Sometimes we complain because we didn't think the street-railway company was properly cooperative about installing drainage ties, track bonds, etc., to reduce the amount of current drained over our pipe system. Nobody paid much attention to the large "negative areas." They were usually dismissed with a shrug. We recognized that this was the area in which current was flowing onto the pipe line. But since most of the steel pipe was screw coupled, it didn't make very much difference.

There are literally many thousands of galvanic cells of all types along the lines in these negative areas. They are kept inoperative by the flow of current onto the pipe line. As soon as the street railway stopped operating, these latent galvanic cells started operating. Within a few months or years, the lines developed leaks, the length of time required depending upon the activity of the cels in these new areas of corrosion.

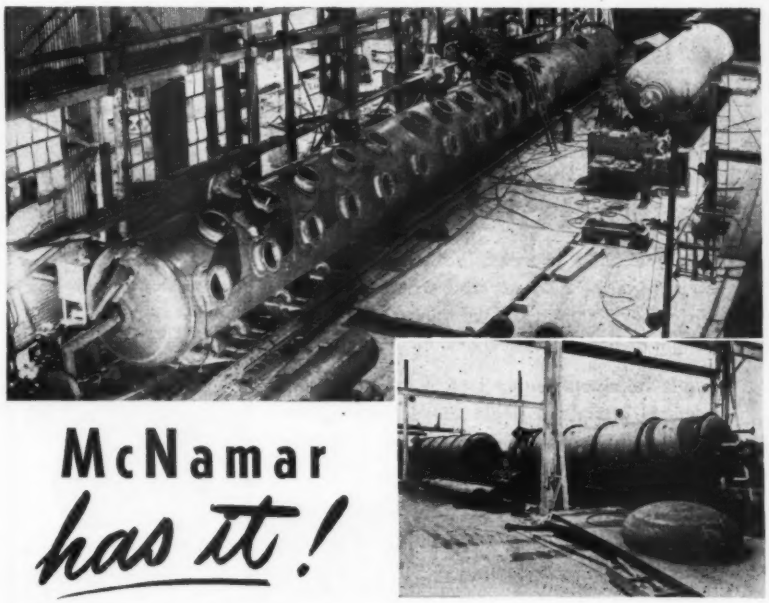

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Fig. 1—Cut-away view of reducing size WeldOlet with welding outlet in place. The external rib and wide bases or footings of WeldOlets eliminate the need for extra supports to take care of bending or vibrational stresses at crotch section, the point of greatest stress.

Fig. 2—Note blending of ear portion of welding fitting to run pipe. Extension of weld metal below inside scarfed portion of pipe insures all sections of joint greater than pipe wall thickness.

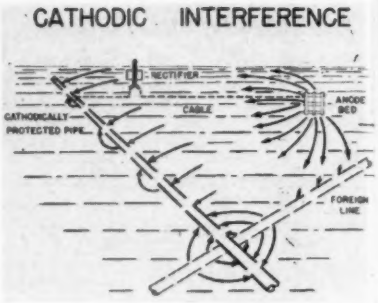

Fig. 13

The pipe lines are still probably not corroding quite as fast as they would have if the electric railway had not have been operating. Some of the dissimilarities originally present when the lines were constructed (for example, wrench or tong scratches) no longer exist, so the total number of possible active cells is less than it would have been when the line was new.

If current flowing onto a pipe line from the tracks of an electric street railway can keep all these galvanic cells from corroding the pipe, then there should be some way of producing the same result without having to run a railway system (Fig. 12).

The railway bought alternating current and changed it to direct current with a rotary converter at the substation. We can buy alternating current at various places along our pipe system, and convert it to direct current with a rectifier. For us, the ground bed takes the place of the rails of the trolley system, and current flows from the ground bed onto the pipe line. It can then be drained off the line by attaching a wire to the pipe and connecting it to the rectifier, just as we used to attach drainage wires to the positive area at the substation to lead the current back to the converter.

Although this method of protection is simple in principle, its application can become complicated, particularly if there are other underground structures in the same area (Fig. 13). Suppose, for example, there is a high-pressure line going through that portion of a distribution system which it is desired to protect. This high-pressure line will also pick up current

(Continued on page 107)

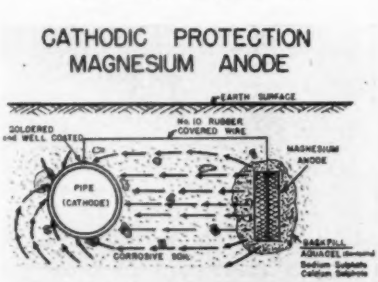

Fig. 14

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IN MANUFACTURING

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To aid the refiner in the most effective use of a complete line of gasoline additives, Du Pont provides an extensive service program. The following outline highlights where some of these services are of aid.

IN RESEARCH

Research Helps Match Fuels and Additives to Engine Needs—In the Du Pont Petroleum and other laboratories research effort is being directed at those problems of the refiner which involve development of new fuels and better combustion control.

Problems Under Investigation — Among specific studies being made are the following:

Combustion Reactions — Investigating the chemical changes that take place in the air-fuel mixture under pressure just prior to combustion and during combustion.

Deposit Studies—Research into the chemical nature of engine deposits.

Sulfur in Gasoline—The how and why of sulfur effect upon octane number of leaded fuels.

Effect of Fuel Components on Performance—Research, recently completed, provides information on the blending of fuel components as they affect TEL requirements and performance.

Du Pont Research Is of Use—Significant findings on research projects are made known to refiners:

Through Publication of Papers—Papers on research results are presented at technical society meetings.

Through Meetings with Refinery Research Groups—Members of the Du Pont research staff discuss projects under investigation in meetings with a refiner's own research group.

Company-wide Research – Findings of other Du Pont research laboratories are available at all times to the Petroleum Chemicals Division for consideration as to their application to the petroleum industry.

●

IN MANUFACTURING

Aid in the Most Effective Use of Additives—Du Pont provides a complete range of services that function within the refinery.

TEL Blending—Du Pont representatives are thoroughly familiar with requirements as they apply to men, equipment and methods.

Blending Plant Design, Construction—Complete construction drawings and specifications for blending plants, as well as advisory help on plant site selection and construction, are available.

Blending Plant Operation—Du Pont representatives aid in the training of operating personnel.

Maintenance and Repair—Assistance is always available when repairs must be made.

Tank Entries—Petroleum Chemicals representatives will attend and advise on cleaning of tanks that have contained leaded gasoline.

General Refinery Safety Program—An over-all refinery safety program prepared by Du Pont is available to any refiner.

Field Laboratory Services Work on Many Problems—Five Field Laboratories throughout the country assist on problems involving the use of additives.

TEL Blending Studies—These laboratories are equipped to make TEL analyses and blending studies on gasoline stocks.

Octane Ratings—They also make routine octane ratings quickly and accurately.

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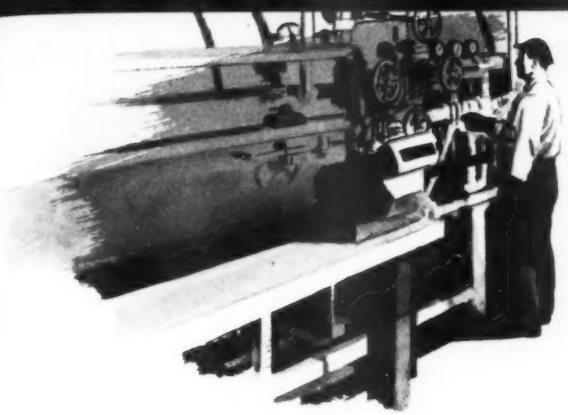

Gasoline Quality Survey — The laboratories cooperate with refiners in nation-wide sampling and local evaluation of their fuel.

Assistance with Other Additives—Recommendations on the use of Du Pont Gasoline Antioxidants, Metal Deactivator, Gasoline Dyes and other additives are also available through the laboratories.

•

IN MARKETING

Services Helpful in Dealer Training and Sales Planning—These services are designed to supplement and strengthen the individual refiner's own promotional efforts by supplying assistance at those points where it is felt Du Pont can be of most help.

For Dealer Education—To aid you in keeping your dealers better informed on the sales qualities of your fuels, Du Pont offers the following aids:

Informative Talks—Non-technical or semi-technical talks for dealer meetings.

Cartoon Movie—A seventeen-minute, four-color, cartoon movie, understandable to any group, "What Makes A Gasoline Good?"

Cartoon Book—A 16-page cartoon book in full color telling the same story.

Instructive Laboratory Meetings—Tours of the Du Pont Field Laboratories and meetings for refinery sales engineers or marketing groups.

To Aid in Planning Sales—Factual information on gasolines being marketed throughout the country is provided by:

Quarterly Motor Gasoline Survey—Individual brands, premium and regular, are listed by code number together with their motor and research octane numbers, and the lead content per gallon. City averages are also shown.

Other Marketing Aids—Assistance is also available in meeting the problems of your customers.

Traveling Fuel Test Fleet—Demonstrates the importance of gasoline quality to car performance through actual demonstrations of road test techniques.

Services to Fleet and Bus Users of Your Fuels—Du Pont automotive specialists are available for consultation on fleet operating problems or on any problem involving motorized equipment.

Bulletins on Equipment Operation—Based on Du Pont's laboratory and road test experience, bulletins are prepared covering various technical aspects of the equipment used.

Safety Services for Marketing Departments—Du Pont representatives are available for consultation on safety and medical problems wherever tetraethyl lead compounds are used in bulk plants or other marketing department units.

For a complete description of the services which Du Pont offers, ask your Petroleum Chemicals representative to reserve a copy for you of the 32-page book, soon off the press, "Du Pont Services to the Petroleum Industry" . . . or write your nearest Du Pont District Office.

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GASOLINE ANTIOXIDANTS

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METAL DEACTIVATOR

Wherever copper, in any quantity, is present in gasoline, the use of Du Pont Metal Deactivator is recommended. It can be demonstrated by laboratory tests, and through actual case histories, that its use, in such cases, materially reduces antioxidant treating costs.

GASOLINE DYES

Du Pont Gasoline Dyes include Oil Red, Oil Yellow N, Oil Orange, and Oil Blue A. To assist in their use, the Field Laboratories provide a comprehensive dye evaluation service.

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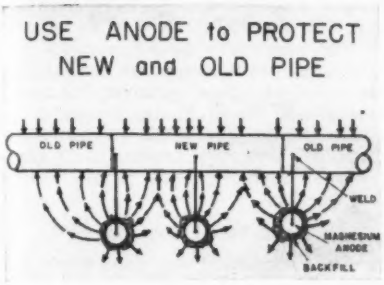

Fig. 15

from the ground and carry it along to some place where the line crosses over, or goes near, the distribution pipe. Then, because the current has to get back to the power source, it will jump from the high-pressure line through the ground to the distribution line.

This short section of the high-pressure line becomes an anode. Every ampere of current leaving the pipe is going to carry pipe metal with it, 20 lb. per ampere per year, and a leak on the high-pressure line can be guaranteed. In practice, the use of impressed current to protect a network of lines becomes so complicated that its application should only be undertaken by the experienced electrolysis and corrosion engineer.

We have seen that a copper service line can be protected by reason of its being the cathode of a dissimilar-metal galvanic cell. It follows quite logically that if it were possible to make all the area along a pipe line the cathode of a strong galvanic cell by using an expendable dissimilar metal, it would be possible to suppress the natural anode areas along the pipe, and thus keep them from developing pit holes.

There are three readily available metals, aluminum, zinc, and magnesium, each of which will form reasonably strong galvanic cells when combined with iron (Fig. 14). Any one of the three can be used to construct this galvanic cell. Magnesium forms the strongest cell of the three, and is therefore most often used.

This expendable anode galvanic cell is similar to the flashlight battery mentioned earlier. The magnesium ingot is the expendable anode, the outer case of the battery; the soil is the electrolyte; the pipe surface, the center cathode; and an insulating wire, with one end soldered to the pipe and the other end to the magnesium, completes the electrical circuit. Current will flow from the magnesium to the ground, taking metal ions of magnesium with it. It then flows through the ground onto the pipe, counteracting the natural galvanic cells caused by any of the dissimilarities we have been discussing.

The practical application is just as simple (Fig. 15). Any time it becomes necessary to replace a short piece of line, two or three anodes, or one anode for each 20-ft. joint, can be installed at the same time in the same ditch with the pipe. Once the field crews have been shown how to make the installations, they can continue by themselves. There is no need for an elaborate survey, and no corrosion engineer has to be on hand for each individual job.

The science of galvanic electricity has expanded greatly since the day Galvani first noticed the twitching of the frogs' legs. We now know that not only will copper and iron produce galvanic currents, but also that almost any dissimilarity will produce these currents. We find that these currents are produced by dissimilar metals, such as top soil, clay, loam, and shale; by dissimilar surface finish or condition, such as the scratches made by using a pipe wrench; by dissimilar soil mixture conditions in otherwise uniform soil; by dissimilar aeration of soil, that is, loose backfill and undisturbed soil on the bottom of the ditch, to name just a few of the more important dissimilarities. Some of these galvanic cells can be avoided by proper design before construction. Others are unavoidable, or have already been built in, but can be counteracted by one of several treatments, such as using impressed currents, by installing expendable anodes, or by using pipe coatings having an electrical insulating value.

Isosynthesis Process

(Continued from page 95)

were added to the thorium oxide. On this same premise, substances which favor this "dehydration" of alcohols were used. Combinations of all these catalysts were tried.

Aluminum oxide-thorium oxide.—Of the catalyst combinations tried, it was found that addition of zinc oxide to thorium oxide gave an increase in the yield of liquid hydrocarbons, and addition of aluminum oxide increased the yield of isobutane. The yield of isobutane was especially high if about 3 per cent of potassium carbonate was added to the Al_2CO_3-ThO mixture. Therefore the aluminum oxide-thorium oxide-carbonate mixture was the most desirable for the isosynthesis. Table 2 summarizes results of experiments with the most successful mixtures.

The combination tests were carried out under a large variety of conditions. With the aluminum oxide particularly was the method of handling the catalyst varied. Three procedures were used: the thorium oxide and aluminum oxide were precipitated together, they were precipitated separately and used separately in the reaction chamber, and were precipitated separately and mixed while still moist. A 20 per cent mixture of the alumina was found to be the most suitable, with the latter method of preparation. As mentioned, addition of a small percentage of potassium carbonate to the alumina-thoria mixture gave a still higher yield of branched C_4 compounds. Table 2 shows the yields from various combinations of alkali, alumina, and thoria.

Zinc oxide-thorium oxide.—A catalyst prepared by coprecipitation of thorium oxide and zinc oxide upon addition of nitrates of the two metals to a solution of sodium carbonate also produced good results. The mixture consisted of about one-third zinc oxide. These zinc oxide-thorium oxide catalysts showed a tendency toward the formation of liquid hydrocarbons and a marked disinclination toward the formation of carbon. Table 3 shows test results.

Aluminum oxide-thorium oxide.—A catalyst mixture of aluminum oxide and zinc oxide will replace thorium oxide to some extent. However, it tends particularly toward the formation of alcohols. On a space-time

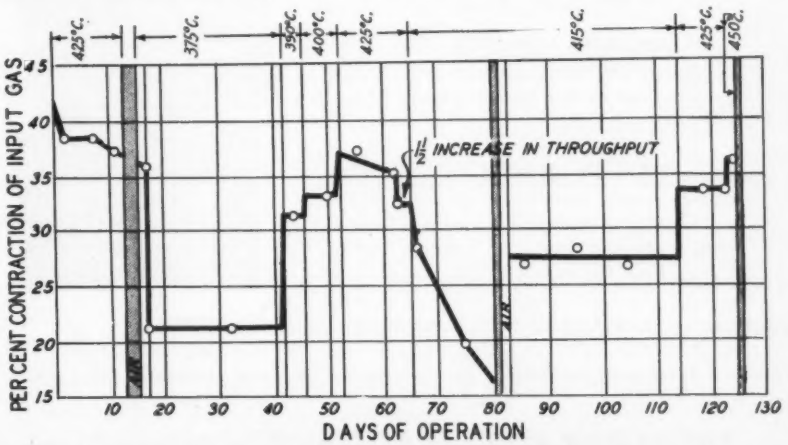

Fig. 3—Course of a life test on a (ThO_2 + 20 per cent Al_2O_3) catalyst at 300 atm. and various temperatures.

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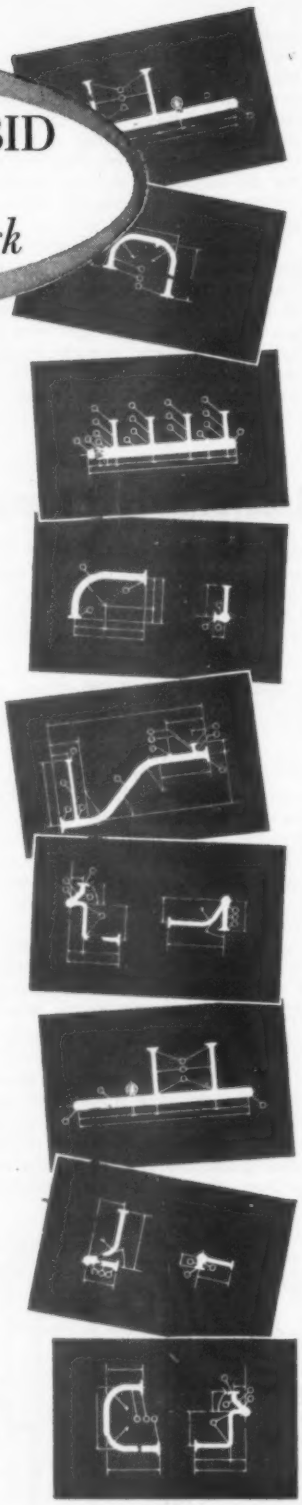

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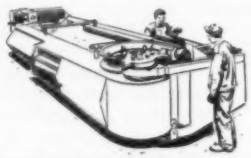

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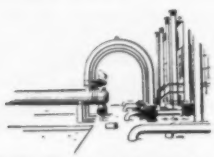

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basis, the thorium-mixture catalysts are far superior.

Thorium oxide-chromium oxide and thorium-iron mixtures are far inferior to any of those catalyst mixtures mentioned above. Diatomaceous earth added to the $ThO\text{-}Al_2O_3$ mixture gave rise to a tendency toward the formation of methane, and straight-chain compounds.

Long-Term Experiment

An experiment to determine the durability of the aluminum oxide-thorium oxide catalyst was carried on nearly continuously for a period of about 4 months. During this time there were two short interruptions in operation for regeneration of the catalyst. Fig. 3 shows a plot of contraction of input gas due to reaction versus days of operation. The amount of contraction is a measure of activity of the catalyst.

The catalyst had rather high activity throughout the experiment. The need for regeneration was shown by an increase in the resistance of the catalyst to flow of the gas through it. Treating with air at 425° C. until CO_2 disappeared from the exit air stream removed the resistance, the catalyst exhibiting little change in activity. Yields of isobutane throughout the test were good.

Conversion of Dimethyl Ether

Since dimethyl ether often occurs as a product of isosynthesis at high pressures, possibly as an intermediate compound, additional experiments were carried on to determine the feasibility of converting it into the desired hydrocarbons by use of isosynthesis catalysts. In the first experiment a mixture of the ether and nitrogen was passed over the normal thorium catalyst with no conversion at atmospheric pressure and a small amount at higher pressures. The activity of the catalysts decreased markedly during the test.

When hydrogen was substituted for the nitrogen, over 40 per cent of the dimethyl ether will convert to iso-C_4 compounds and liquid hydrocarbons, a greater portion going to the isocompounds at higher pressures.

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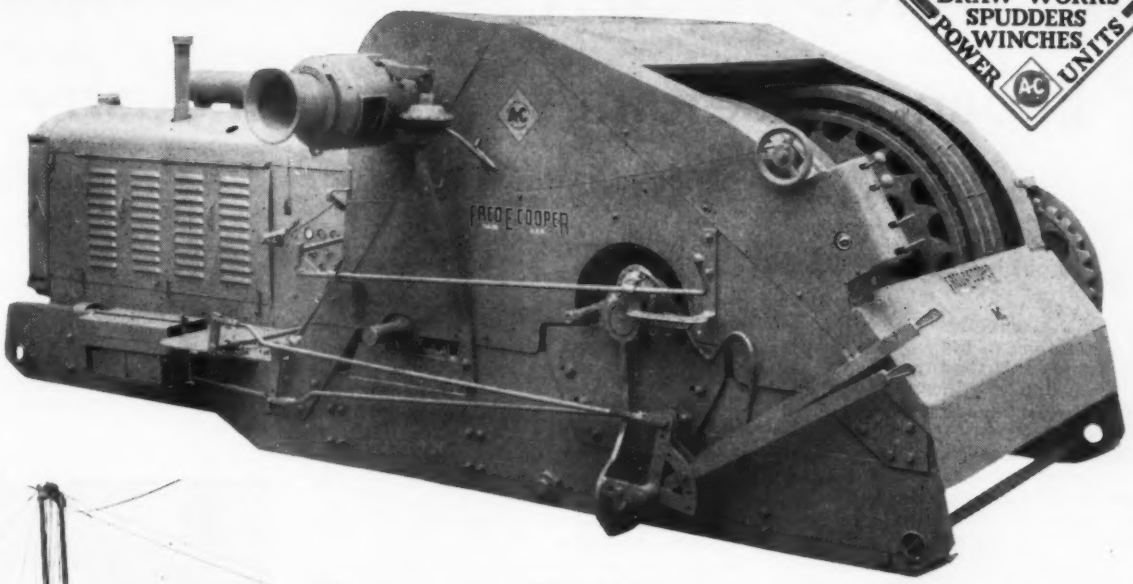

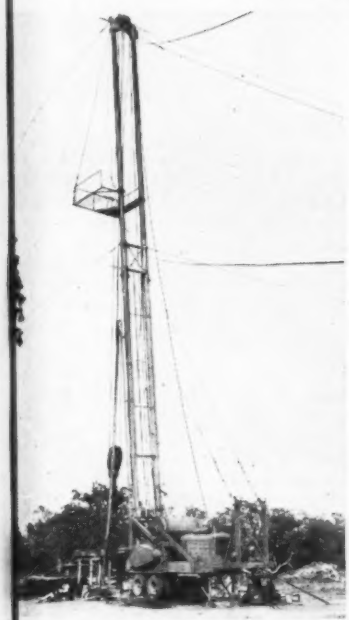

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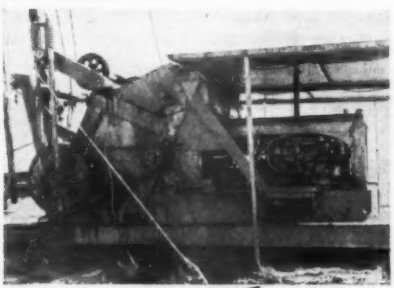

TOP: Model L-844, Draw Works for Rotary Drilling to 4,500 feet*, Work-over and Servicing to 10,000 feet.

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SPECTROSCOPY

Expands Usefulness to Oil Industry

Several new techniques have reached practical application stage

by George Weber
Refining Editor

THE spectrograph, an accepted analytical tool in the research laboratory, is now emerging to new uses in the refining, production, and technical service divisions of the oil industry. Long familiar to the physicist and petroleum chemist, spectroscopy with newly devised automatic equipment is entering such fields as process inspection and control, well surveying, and rapid routine analysis.

Spectroscopy, like other techniques relating to research and industrial production, saw substantial new application during the war. Based on that accelerated development, the art has made phenomenal postwar strides in commercial application. The basic idea of studying spectra of visible light waves first came into use 100 years ago and contributed much to research on the theory of atomic structure. The technique now includes study of many types of energy waves or radiation in addition to the relatively narrow spectrum of visible light. Spectroscopy has been applied to the field of chemical analysis for 20 years. Despite this long record, the technique today is relatively new in many fields, and its reputation for rapid, accurate analysis is now becoming widely recognized.

Broadening Scope

The use of spectroscopy is being extended as the result of a two-way expansion. Several new techniques have reached practical application in the past 5 years, and still others are now in various stages of development. These new methods provide further checks on existing ones and open new fields to analysis. In addition, the earlier methods of spectroscopy have reached new levels of use through the design of completely automatic instruments which provide not only continuous and accurate analyses of product streams, but afford the means for controlling processes to maintain specified product quality.

Spectroscopic Fields

At the present time, 10 different fields or methods of spectroscopy are either in practical use or in development stages promising commercial application.

1. **Emission spectroscopy** covers the entire field in which the spectra of energy waves given off by a sample are studied. In this destructive type of analysis, the sample is excited by means of an arc, a spark, a flame, or a discharge tube.

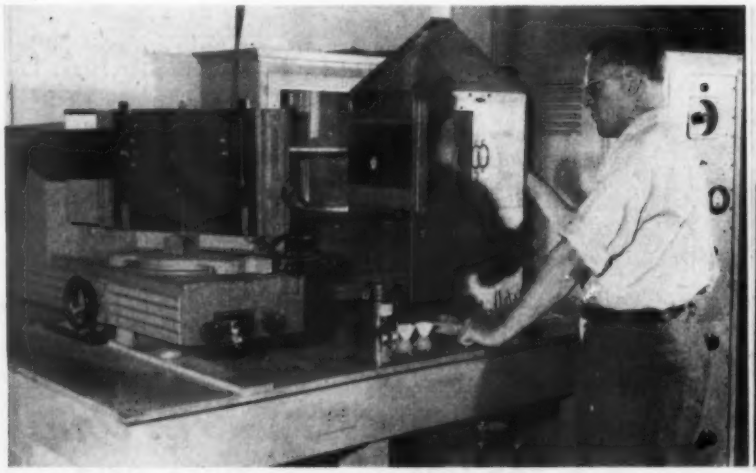
Emission spectrographs reveal data on the atoms in the sample and produce a qualitative and quantitative analysis of the elements which it comprises. To date, they can be employed to identify 70 of the 98 known elements.

This type of instrument was one of the first used and the data amassed on spectral lines is very complete. Wave lengths for over 100,000 lines have been identified, tabulated, and published.

2. **Ultraviolet absorption** employs a mercury or hydrogen lamp or glowing bar as a radiation source. Light is passed through the sample and the wave lengths of absorbed radiation identify the molecules in the sample. The degree of absorption reveals the quantity of each molecule.

This method for inspecting gases and liquids is widely used in hydrocarbon analysis. It is more accurate

Left: In this emission-type spectrograph, a sample of ash is being analyzed. The sample is excited by an arc in the hood, right. Radiation from the burning sample enters the spectrograph through a slit (hidden), travels to one end of the instrument, extreme left, where it is dispersed by a prism and focused back on a photographic plate in the holder marked "A." This instrument is a Bausch & Lomb Littrow Quartz Spectrograph. Right: This X-ray spectrometer is used for both X-ray diffraction and X-ray absorption analyses. Here the operator is setting up a sample for obtaining a diffraction pattern. For X-ray absorption work, an absorption tube is placed before the Geiger counter which is housed near the operator's left elbow. This instrument is a North American Philips X-ray Spectrometer. (Photos courtesy Socony-Vacuum Laboratories, technical service department, Brooklyn.)



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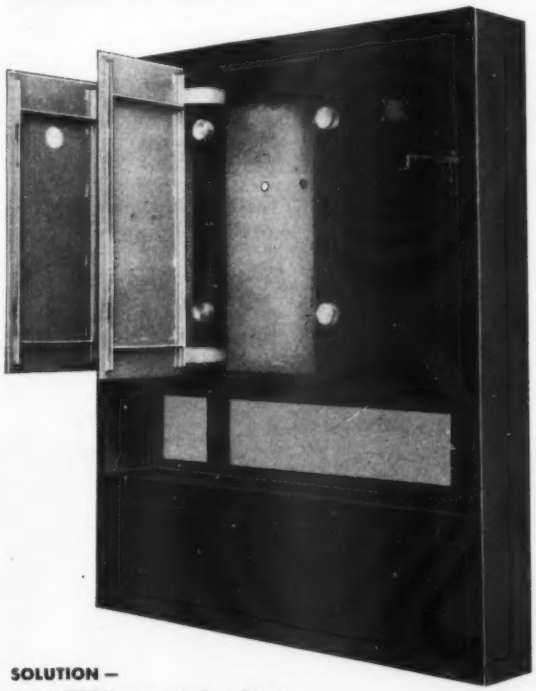

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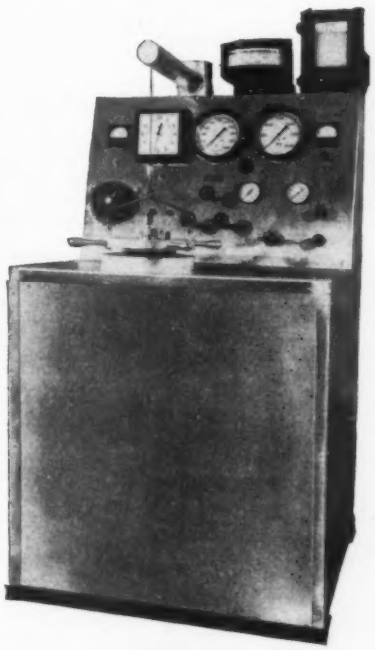

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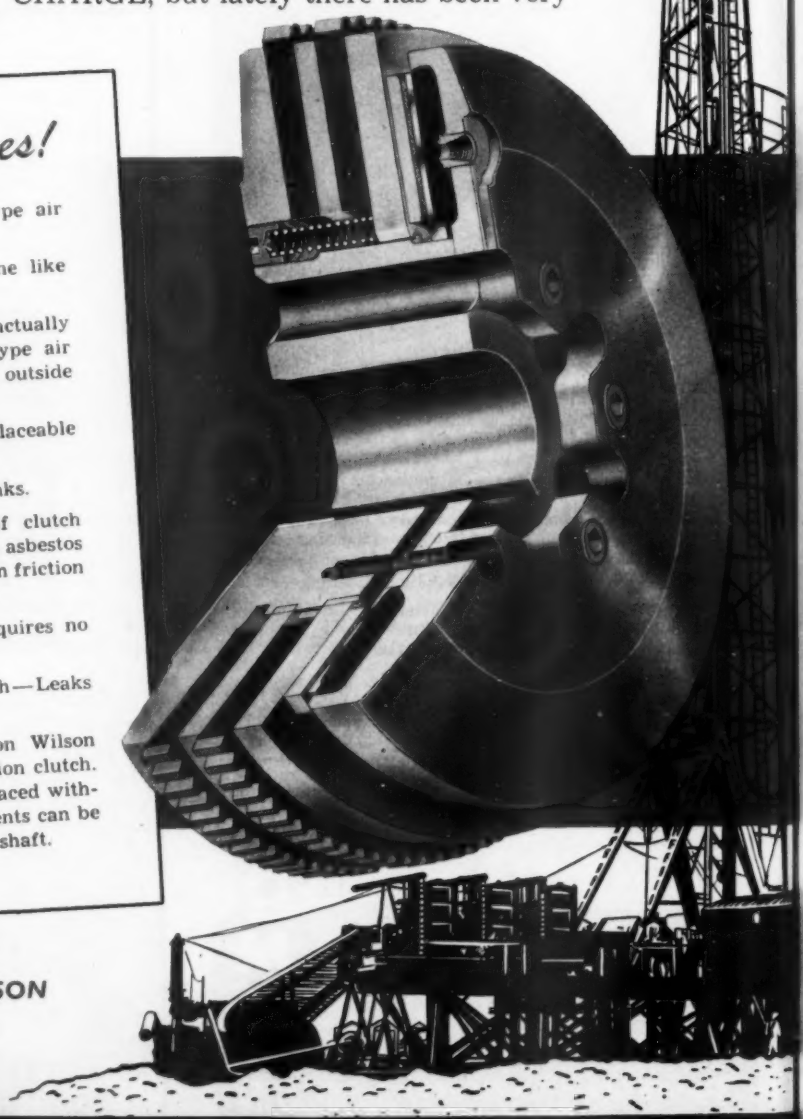

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than chemical methods and for some compounds, is the only analytical method available.

Ultraviolet absorption reveals complete molecules, differentiating, for example, between benzene and toluene in a sample. Comprehensive reference literature on hydrocarbons is being collected and issued under A.P.I. Project 44.

3. Infrared absorption, another nondestructive method for analyzing liquids and gases, reveals parts of molecules, such as the hydroxyl groups present in alcohols, or hydrocarbon radicals such as CH_2 or CH_3. This analysis is also quantitative, and is widely used in petroleum laboratories.

The infrared spectrum reveals the difference in resonance of energy waves absorbed by normal and double carbon bonds and is further useful in differentiating between olefin and paraffin hydrocarbons.

4. X-ray spectroscopy.—Two methods are in practical use; based on absorption and diffraction of X-rays by samples. X-ray absorption, employed like other absorption or subtractive techniques, gives information about elements and has found use in rapid determination of the quantities of sulfur and tetraethyl lead in gasoline and other petroleum products. It may be used to control blending of TEL in gasoline by revealing the quantity of a key element such as lead, chlorine, or bromine.

X-ray diffraction gives information on molecules, states of hydration, and complexes. It is used largely for analyzing solids and finds practical application in identifying unknown materials in such substances as corrosion products and engine deposits.

5. The mass spectrometer measures the mass or weight of molecules which make up a sample. It shows quantitatively the percentage of compounds of given molecular weights. It can distinguish medium and light hydrocarbons differing by only one mass unit and heavy hydrocarbons with molecular weights of 250 or higher, by two units of molecular weight. It is used largely for analysis of gases, whose components are readily identified by their masses.

6. Raman spectroscopy, which comprises a study of reflected or scattered light from a mercury vapor source, almost overlaps or duplicates the work of the infrared spectrograph. It is considered somewhat better for analyzing aromatics.

7. Neutron spectroscopy goes beyond other methods in that it reveals information on the nucleus of the atom. Resonance absorption of neutrons occurs for many elements at certain neutron velocities, providing a key for qualitative and quantitative analysis.

This technique, just emerging from the theoretical stage, can be used to identify traces of rare earths. It picks out hydrogen very well and promises application in well surveying to determine levels at which liquids occur.

8. The microwave spectrometer operates in the very short radio waves employed in radar and is a direct result of wartime radar development. It is still in the laboratory stage of investigation. It has potential application in distinguishing pure hydrocarbons from hydrocarbon derivatives such as oxides, sulfides and halogenated hydrocarbons.

9. Other techniques still in the theoretical stage are radio-frequency spectroscopy and radio-frequency mass spectroscopy. Although not yet in commercial use, a radio-frequency mass spectrometer has been developed which uses velocity selection rather than magnetic deflection. This adaptation may prove simpler and less costly than existing methods for determining molecules by their mass.

10. A possible new technique involves analysis of samples by their fluorescence when exposed to X-rays. This prospective method relates to the determination of elements in metallic and nonmetallic substances.

The petroleum industry is exploring all developments in spectroscopy and investigating new uses to which the technique may be put. All phases which have reached practical application have been put to work in analytical research laboratories. Some, including emission, ultraviolet, infrared, and X-ray types are used in routine analytical work in control laboratories and technical service laboratories, where they have greatly increased efficiency and reduced cost.[1]

In further application to process control, spectrometers promise even greater benefits. Automatic infrared analyzers have given dependable automatic analysis and control of several refining processes,[2] including furfural extraction, HF alkylation, and normal butane-isobutane fractionation. One instrument is used to record the methane content of 18 different streams in a process with an accuracy of ± 0.2 per cent methane at full scale. Their application for the present is largely confined to gaseous hydrocarbon streams at atmospheric pressure. The mass spectrometer has also proved efficient in analyzing process streams and by means of such analyses, controlling certain process conditions. One major company has so used this tool effectively for over a year, and a second company is investigating such an adaptation. Other spectrometers have found use in controlling the compounding of additives with lubricating oils by analysis of some key element in the additive.

This new field of application results from the trend toward greater automatic instrumentation in spectrometers. Some models in the infrared, X-ray, and mass fields have been de-

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veloped which not only give direct readings in percentage content of certain elements, but continuously record such data or transmit them to process units or control points. Only a simple step remains to make such instruments actuate valves to control flow, temperature, or pressure.

In providing rapid analysis, spectroscopy stands alone among analytical methods. As an example, a spectrometer has been developed which gives separate analyses in milliseconds and has been used to good advantage in studying jet-engine exhaust which changes very rapidly during the warmup period.

Ample evidence of this broadening scope of spectroscopy was to be found at the fifth annual meeting of the Society for Applied Spectroscopy held recently in New York. Twenty-one technical papers presented at the busy 2-day session dealt with new techniques employing neutron spectra, and X-ray fluorescence spectra. An exhibition of new spectroscopic equipment underscored the important part played by instrument manufacturers.

With 150 individual members and 18 sustaining company members, the S.A.S. is believed to be the largest and oldest of more than a score of similar organizations established throughout this country and in western Europe. The group's membership, mainly from the New York-Philadelphia area, includes a large percentage of petroleum-industry representatives. S.A.S. publishes a monthly Spectroscopy Bulletin, the only periodical of its kind, with an international circulation of 1,500. In addition the society coordinates its work with other similar groups and participates in a joint committee on nomenclature with the A.S.T.M.

The mass of technical reference data on spectroscopy, which is accumulating in research laboratories, presents a problem of classification and organization. Some agencies, notably the A.P.I. and National Bureau of Standards, are correlating some classes of information. Much work remains to be done to render spectroscopy more useful by means of better organized information on spectra. The Society for Applied Spectroscopy and other similar groups may provide the basis for an integrated association responsible for collection, organization, and dissemination of useful reference data on the rapidly developing analytical technique.

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2. "Continuous Analysis and Control of Process Stream Compositions with Automatic Infrared Analyzers," by T. C. Wherry and F. W. Crawford, Phillips Petroleum Co., The Oil and Gas Journal, March 23, 1950, p. 272.

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—John A. Sleeth, Chief Gauger Union Oil Company of California in the March 1950 issue of PETROLEUM ENGINEER, *page D-50*

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PUMP STUFFING BOX

for obnoxious or inflammable liquids

by C. A. Butler, Jr.* and R. C. Sutter†

OCCASIONALLY plant operators are faced with the problem of pumping a liquid of a nature such that no drippage at all from packing can be tolerated. Usually such situations can be taken care of by ordinary methods of supplying a sealing liquid through a lantern gland, by sealing with grease, or by one of the various forms of mechanical seals which are available. But sometimes the liquid being pumped is of a nature that precludes the standard remedies.

The problem.—A liquid was to be handled which was so obnoxious that an operator couldn't stay in the pump house with even a slight drip from the packing. The liquid was a solvent which made grease sealing impossible. The gland could not be sealed with water since the system had to be kept absolutely anhydrous, and there was no sealing liquid available which could be introduced through a gland because it was impossible to allow contamination of the fluid being pumped.

The solvent action on any packing or mechanical seal made it necessary to keep the liquid being pumped out of contact with a shaft seal under normal operation. In solving this problem, a simple scheme was applied which probably has many applications to difficult pump-sealing problems.

Solution.—The theory applied in solving this problem involves employment of a sealing fluid which has a radically different specific gravity from the fluid being pumped. This might be a light liquid used in conjunction with the pumping of a heavy liquid, if it is objectionable to use gas as the sealing medium, as was the case here. In applying this theory, the principle of a liquid-sealed, centrifugal-shaft packing such as is often used on steam-turbine shafts was combined with the action of backvanes on a pump impeller. Dry air from an external source was used to keep the pumped liquid from coming in contact with the stuffing box and the pumped liquid was used as the fluid in the centrifugal portion of the seal. By this means an annulus of liquid is formed in the space between the back of the impeller and pump casing. The gas pressure introduced into the lantern gland will tend to force the liquid toward the periphery of the impeller.

The minimum air pressure required to prevent leakage will be that pressure which normally exists on the stuffing box, and the minimum pressure will be sufficiently higher than the minimum to make it practical to control the pressure of the sealing gas. Since none of the sealing gas is continuously introduced into the pump itself, it will not "gas bind," and the only consumption of sealing gas is that which leaks through the packing. Because the packing proper seals only against gas pressure (in this particular case, dry air) any good type of self-lubricating packing can be used. As long as the solvent is not allowed to come in contact with the packing, the impregnation in the packing will not be removed.

Actual installation.—The accompanying diagram shows the general arrangement of an actual installation which has been operating for a number of months. Operating conditions are approximately as follows:

Suction pressure 30-40 psig.

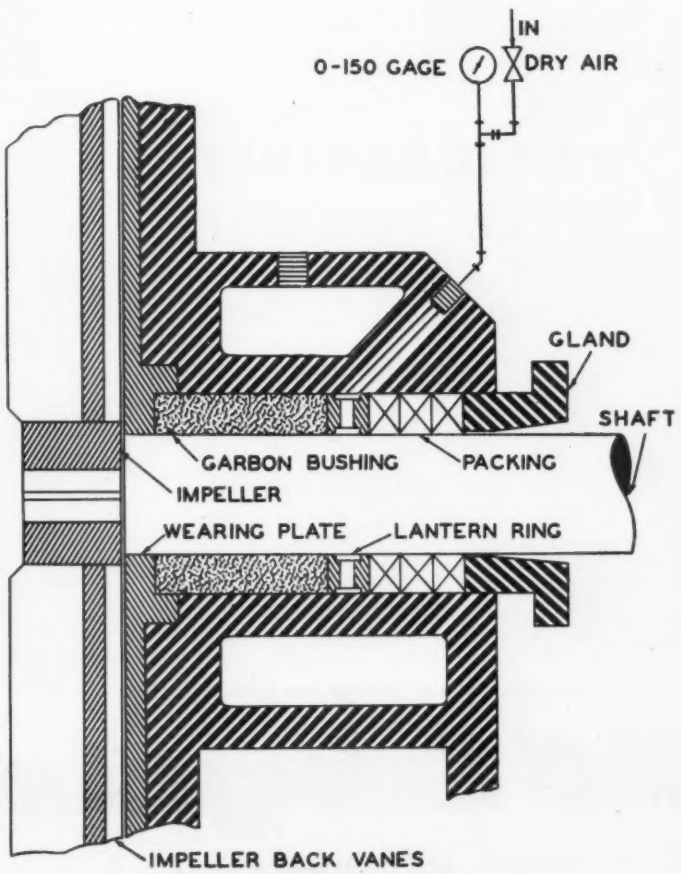
Discharge pressure 150 psig.

Normal gland air pressure 3-10 psig.

Maximum permissible gland air pressure 45 psig.

In this particular installation, the dry air is controlled manually by the operator and requires practically no attention (an inexpensive pressure controller would probably save air). Special care must be taken to maintain close clearance between the backvanes of the impeller and the wearing plate. Under normal operating air pressures, there is no evidence of air leakage into the pump and absolutely no leakage of liquid through the seal.

Other applications.—Where the pumped liquid is highly inflammable, the sealing gas could well be an inert gas such as carbon dioxide or nitrogen. With the shaft packing in good shape, the gas consumption is so low that it would not be prohibitively expensive to supply such gas from a cylinder through a proper regulator.



Air-sealed pump stuffing box.

*Director of engineering, and †design engineer, Diamond Alkali Co., Central Engineering Department, Cleveland, Ohio.

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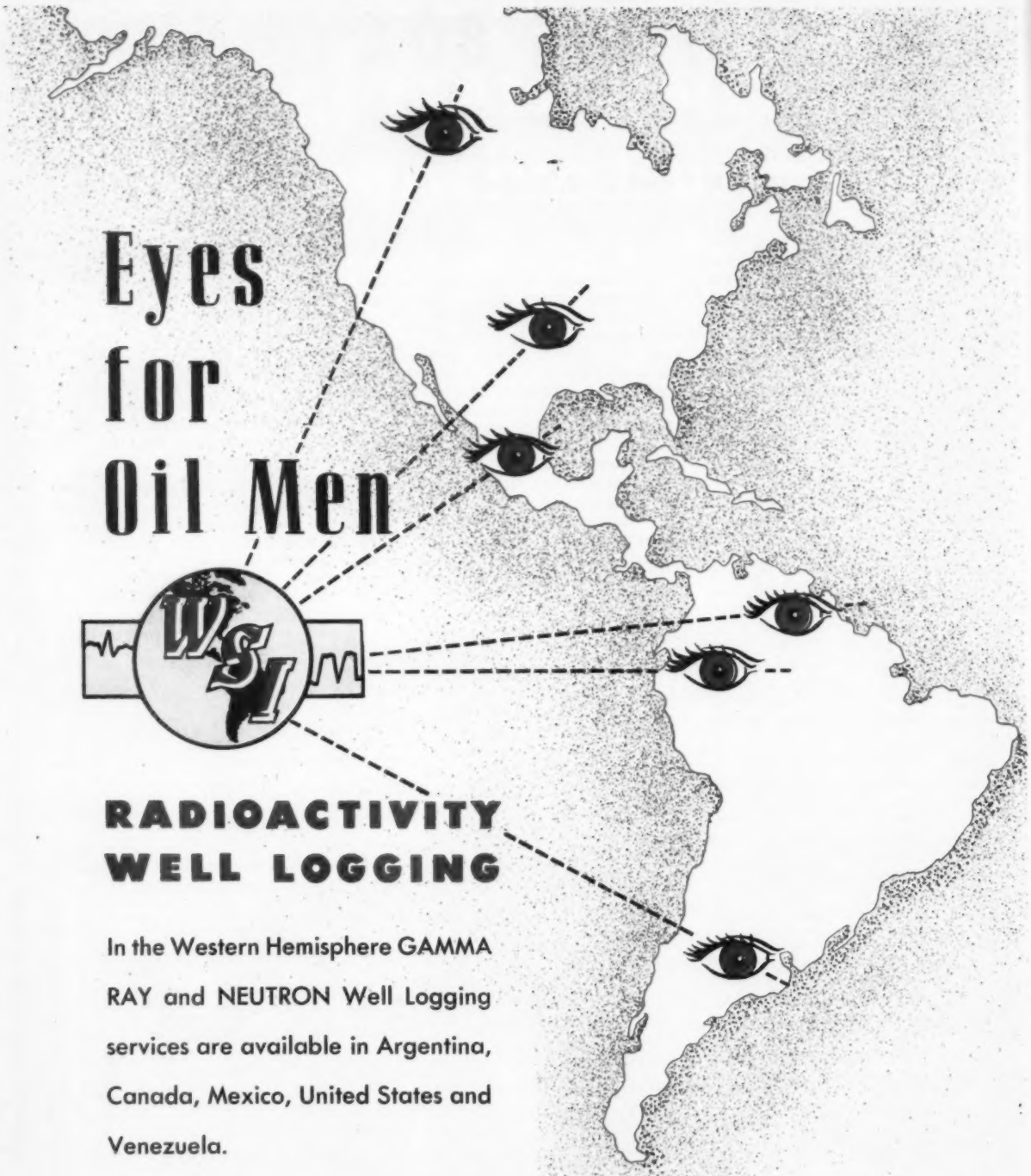

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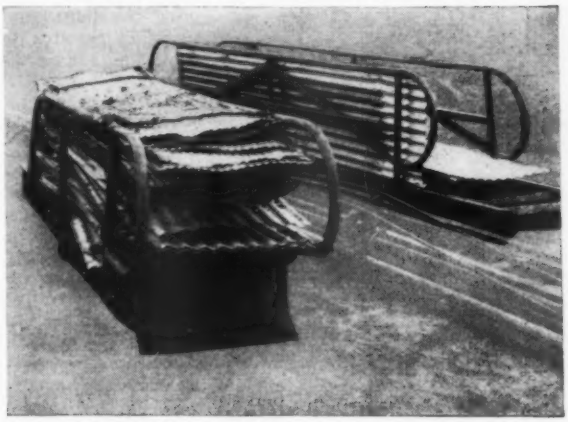
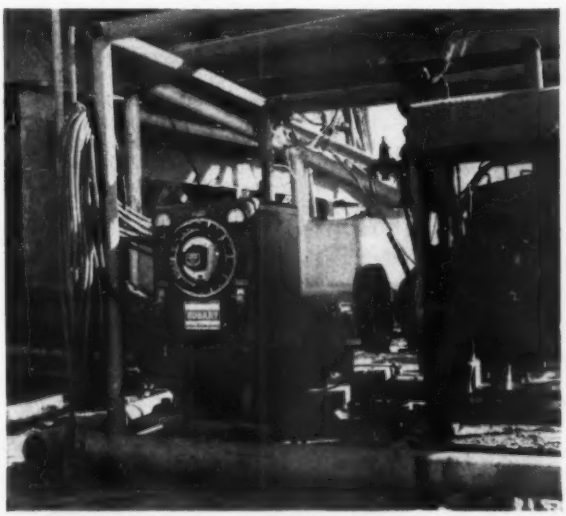


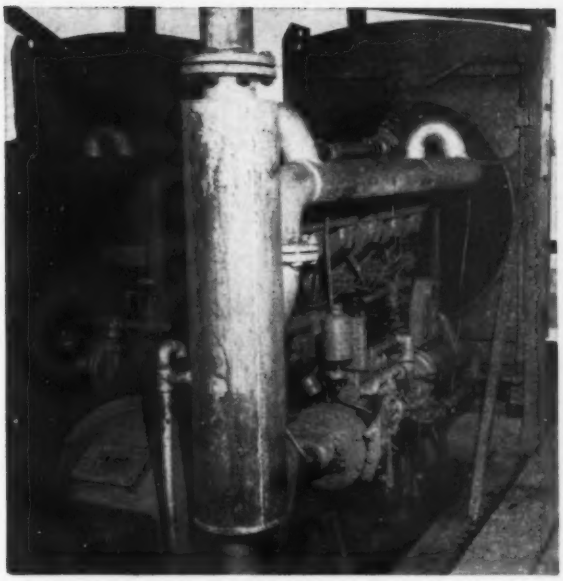
Stairways Used as Carrying Devices in Rig Moves

RIG stairways form a convenient carrying device for the corrugated metal from pump and engine houses, as shown in the accompanying photograph. The sheets are placed in the framework formed by the stairways and, if tied tightly, will remain straight and in order during moving.



Welding Unit in Connection With Light Plant

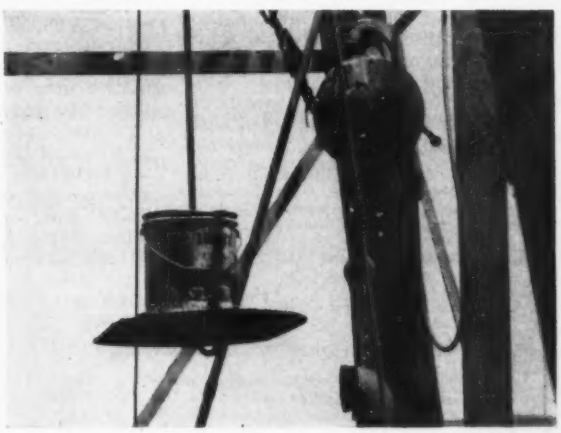
HERE a drilling company has mounted a portable-welding unit on the same frame with the light plant. The welding unit is driven off the same sprocket that drives the generator and is used in an emergency to eliminate shutdown time.



Stationary Mounting Used For Engine Exhaust

UTILIZING a stationary mounting of the engine exhausts, this installation saves rigging-up and fearing-down time as well as possible danger from fire. Short lengths of 6-in. pipe permanently mounted to the engines connect with the 10-in. muffler. An 8-in. baffle pipe inside the 10-in. muffler is drilled with small holes at regular intervals to reduce engine noises.

Water is fed to the exhaust pipe at the front end through a small copper tubing. The 1-in. drain pipe shown to the left of the muffler drains off the overflow water in case the supply is accidentally left on while the engine is idle.



Traveling Platform Facilitates Greasing

TO facilitate greasing of traveling block and kelly swivel, one driller rigged up this elevator. The platform is pulled up by the catline and enables the derrick man to lubricate his block and swivel while in drilling position. By adding a counterbalance the platform can be pulled up out of the way when not in use.

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Field and Laboratory Studies of Methods of

Conditioning Water for Subsurface Injection

by J. Wade Watkins,* C. E. Arthur,* and F. R. Willett, Jr.*

WATERS having constituents that promote corrosion and the deposition of solids usually are conditioned before injection into subsurface strata, to prevent corrosion of metallic equipment and plugging of pores of sandstone and limestone formations. Other waters may be injected without treatment if air is excluded from the injection system.

Many different types of water are injected into subsurface formations in the Mid-Continent area for secondary recovery of oil by water flooding, for reservoir pressure maintenance, and in brine-disposal projects. Different methods of conditioning are used even on similar waters.

This paper discusses briefly the constituents of waters that cause corrosion and the precipitation of solids, the reactions that may occur when two waters containing different dissolved salts and gases are mixed, and the analytical methods used in the field. Results of the study of water-conditioning plants and conclusions drawn are presented. Laboratory studies now under way to substantiate and interpret field data and to study new and different methods of water conditioning not now in general use are described.

In many of the earlier water-flooding projects, water was injected without treatment of any kind. Severe corrosion of equipment and the restriction of injection rates caused by plugging of the pores of reservoir rocks soon necessitated conditioning some waters. Today, some water-flooding projects in the Mid-Continent area employ elaborate water-conditioning plants, whereas others practice little or no treating.

Much damage to pipe, pumps, and other metallic equipment results from the corrosivity of waters having low pH values, resulting from the presence of dissolved hydrogen sulfide and free carbon dioxide. Dissolved oxygen, when present, is one of the chief constituents causing corrosion. Electrolytic corrosion results where dissimilar metals touch, or are in proximity, in the presence of an electrolyte such as oil-field brines. Other factors, such as temperature and velocity of the water, influence the rate of corrosion to a measurable extent.

Plugging Constituents

Many constituents of waters may contribute to the plugging of pore spaces in injection formations or to restricting piping systems. Suspended solids, such as clay, ferric iron compounds, and other insoluble matter frequently cause plugging. Organic matter may be conducted into injection wells and there multiply rapidly, effectively plugging the pore spaces at the well bore and farther back in the formation. Certain species of organisms thrive in waters of high salinity, and some bacteria are anaerobic, living in an atmosphere containing no free oxygen.

The conversion of soluble ferrous iron compounds to the insoluble ferric state by oxidizing agents in the water may cause precipitation of large quantities of solids. Some chemical reactions cause precipitation when two waters are mixed, such as the formation of an insoluble barium sulfate precipitate when waters containing soluble barium are mixed with waters containing sulfates.

Waters highly supersaturated with the normal carbonates of calcium and magnesium precipitate carbonates in the piping system and in the injection formation. This applies particularly when the pressure on the water is decreased, or the temperature is increased, as in either instance the solubility of carbonates in the water is reduced.

Types of Water-Conditioning Plants

Two general types of plants are used to condition waters for subsurface injection. **In closed systems,** an effort is made to exclude air from the injection system to prevent oxidation-reduction reactions which might cause precipitation and to prevent the subsequent dissolving of excess oxygen in the water. An ideal closed injection system, as illustrated in Fig. 1, pumps water from a supply well directly to injection wells, maintaining the water under pressure throughout the system. Surplus water from the supply well is bypassed to a storage tank for emergency use.

In many closed systems, however, the produced water is pumped into a storage tank having a film of oil on top of the water or an inert or hydrocarbon gas in the vapor space above the water (Fig. 2). From this tank the water is pumped to injection wells. The principal disadvantages of systems of this type are that reductions in pressure of the water as it is brought to the surface reduce the solubility of dissolved gases and solids, causing precipitation. It also is difficult in these systems to maintain a good oil or gas seal on the storage tank and airtight connections at all points.

Filters sometimes are used in closed systems. Individual well-head filters containing carborundum or aluminum

*Petroleum Experiment Station, U. S. Bureau of Mines, Bartlesville, Okla. Summary report of paper given at American Chemical Society symposium on "Conditioning Water for Repressuring Oil Fields and Underground Disposal," Houston.

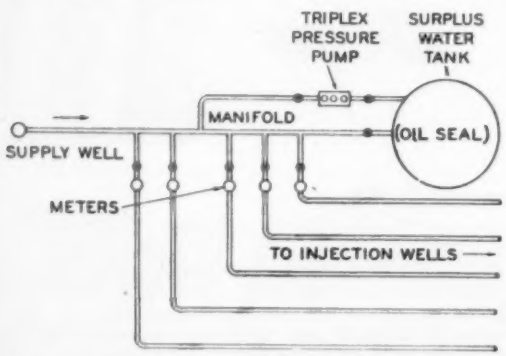

Fig. 1—Closed water-conditioning system (direct injection).

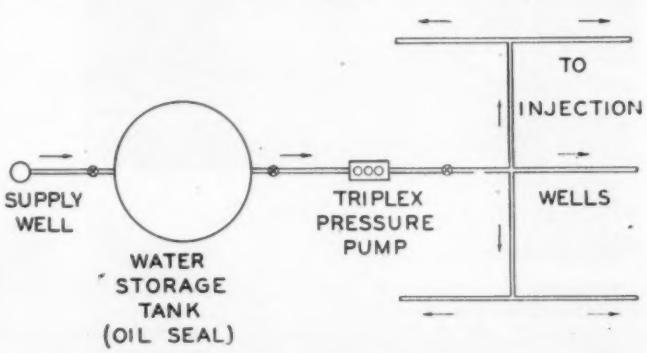

Fig. 2—Typical closed water-conditioning system.

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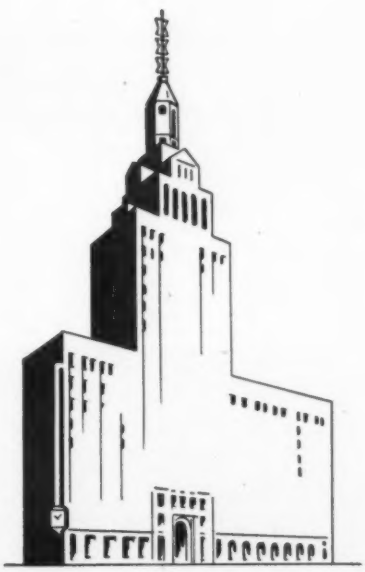

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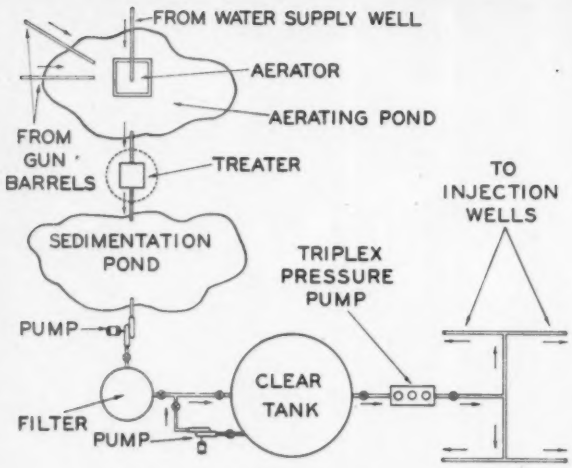


Fig. 3—Typical open water-conditioning system.

Fig. 4—Field corrosion test apparatus.

oxide filter elements, so connected that the element may be back-washed in place, are most widely used. Diatomaceous earth is used as a filter medium in some installations.

In open systems, as illustrated in Fig. 3, no effort is made to exclude air from the water. Instead, the water frequently is aerated to remove hydrogen sulfide, if present, and free carbon dioxide, thereby decreasing the carbonate supersaturation of the water. Aeration also oxidizes ferrous iron compounds to insoluble ferric compounds.

Following aeration, an alkali such as calcium hydroxide or sodium hydroxide usually is added to the water to react with the free carbon dioxide not removed by aeration, and to raise the pH value to a range where better coagulation is obtained.

A coagulant, such as aluminum sulfate, ferric chloride, ferrous sulfate, ferric sulfate, or sodium aluminate also is added if necessary to promote more rapid and complete coagulation.

After treatment, the water usually is conducted through a sedimentation pond or tank, then is passed through sand filters, and into a clear-water storage tank or well. From clear-water storage, the water is pumped to injection wells by a pressure pump.

Some treating plants employ methods that might classify the systems as **semiclosed.** For example, a few plants in the Mid-Continent area use a conventional open-type treating system as described, then pass the water through a vacuum deaerator to remove oxygen that has been dissolved in the water during aeration. From the vacuum column to the injection wells, air is excluded from the water.

In all types of treating systems, when organic matter is present, some **bactericide** or **algaecide,** such as copper sulfate, formaldehyde, or some form of chlorine is used. This particularly is necessary during warm weather. Usually the toxic agent is added to the water before filtration. Some plants inject copper sulfate and chlorine alternately, or use both simultaneously because of the immunity acquired by some organisms to the toxicity of either chemical.

In many plants a **corrosion inhibitor** is added to the water. Sodium hexametaphosphate, formaldehyde, sodium silicate, and some commercial inhibitors are used. Many operators use cement-lined pipe in distribution lines and well tubing, and a few coat the interior of the pipe with plastics as a safeguard against corrosion. When cement-lined or plastic-coated pipe is not used, an effort usually is made to maintain the carbonate supersaturation of the conditioned water at approximately 10 p.p.m. so that the water will deposit a slight carbonate coating on metal surfaces.

Preventive measures against **electrolytic corrosion** have been taken in some plants by using plastic or hard-rubber nipples in the piping system at all places where dissimilar metals join, as at pumps and meters, and by the use of porcelain instead of brass or steel plungers in pressure pumps.

Recarbonation, or the addition of acid to water to prevent the precipitation of carbonates, has been practiced by a few plants in the Mid-Continent area. However, such treatment in most instances has been abandoned because of the increased corrosivity of the water. Sodium hexametaphosphate and other complex phosphates sometimes are added to waters to prevent the precipitation of carbonates.

Methods of Field Tests and Analyses

In the bureau's study of water-conditioning plants all corrosion tests and chemical analyses to determine unstable constituents of waters were made in the field at the plant sites by using a portable laboratory, mounted on a "6 by 6" truck. Efforts were made to select plants for study both on the basis of the type of water injected and the method of conditioning used. Typical installations were studied, as well as those employing unusual or novel methods.

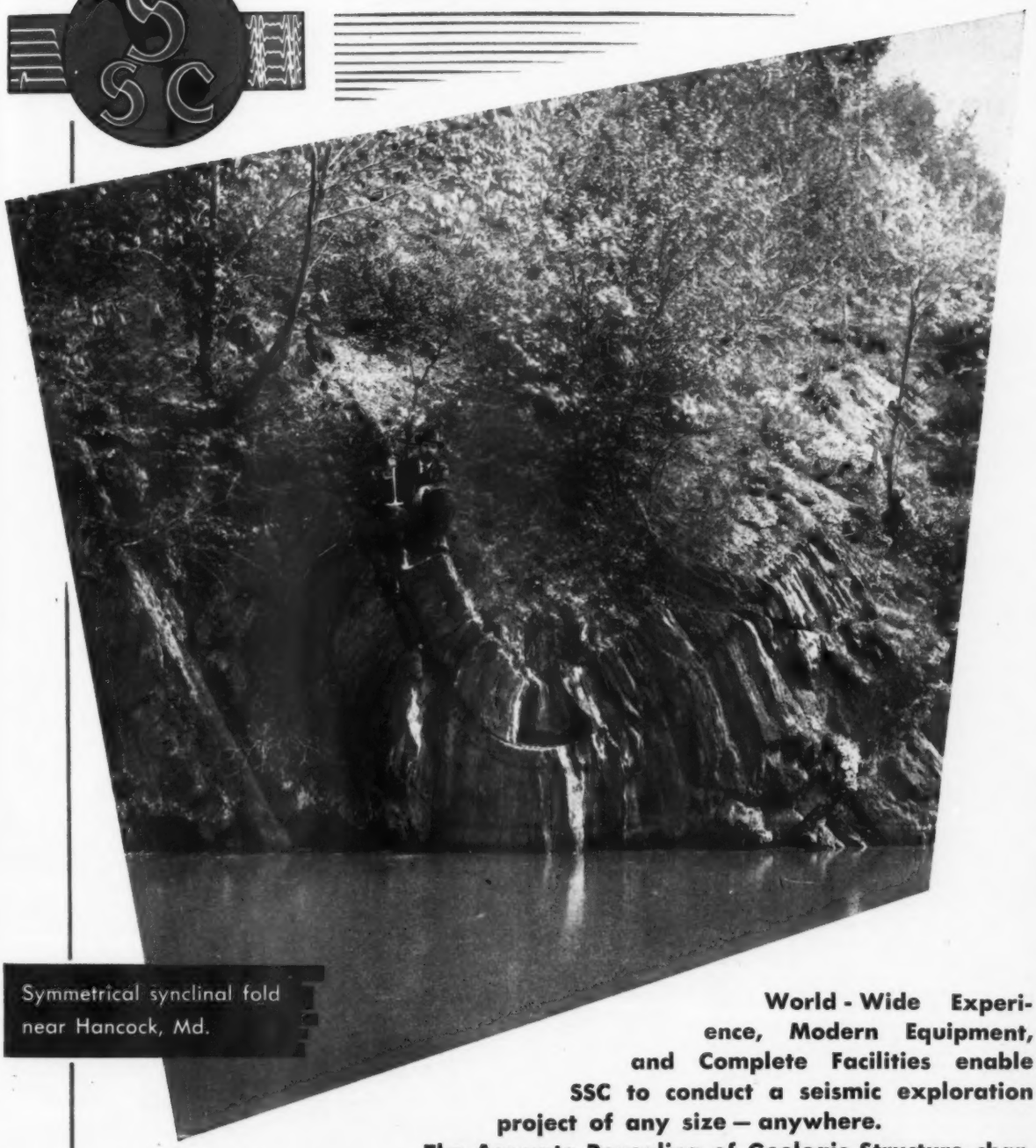
Approximately 1 week was spent in the study of each plant, during which special 72-hour corrosion tests and numerous chemical analyses were made. Sampling locations were selected to test the water at all points in the treating and injection system where any change in its constituents might occur. Usually the raw water (or waters) was tested at its source, after mixing, if more than one water was used, after aeration, chemical treatment, sedimentation, filtration, deaeration, and storage, and at one or more of the injection wells. At the conclusion of the tests complete mineral analyses were made of samples of water from each of the sampling points.

Corrosion Tests

The corrosion tests are based on the loss of weight of a copper-bearing tank-steel disk, 2 in., in diameter, when exposed to the water in a glass jar, through which the water is conducted at controlled velocity and observed temperature for 72 hours.

The corrosion disks were cut 2 in. in diameter from ⅛-in.-thick stock and were machined until smooth. The surfaces of the disks were further smoothed successively with coarse, medium, and fine emery cloth, until all machine marks were removed and a uniformly smooth surface was obtained. The disks then were wet-polished with scouring powder, washed with distilled water, and rinsed in acetone. When prepared in such a manner, the disks appeared perfectly smooth to the eye, but when viewed by means of a binocular microscope the metal was seen to have a rough surface. To avoid excessive initial weight losses due to the rough surface, the disks were "precorroded" in a dilute solution of propionic acid at 130° F. for 24 hours, again scoured, washed, dried, weighed on an analytical balance, and stored in a desiccator.

For the field tests, the disks were suspended in jars as shown in Fig. 4, and the water was conducted through the jars at a flow rate of 0.053 cm. per second. This velocity was high enough to change the water in contact with the corrosion specimens frequently and low enough to avoid washing corrosion products from the surfaces of the disks. Seventy-two hours was selected as the duration of the tests be-



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cause that length of time was found to yield reliable indications of the comparative corrosiveness of the various waters tested. Furthermore, this was a standard exposure time on earlier corrosion tests[1] by the Bureau of Mines at numerous brine-disposal plants. All tests were made at atmospheric pressure, and precautions were taken to prevent the occurrence of electrolytic corrosion. The temperature of the water in the jars was observed and recorded at regular intervals and was considered in the final evaluation of the tests.

At the conclusion of the corrosion tests, the disks were removed from the water-filled jars and inspected. The nature of the coatings on the disks was observed and recorded. Compounds most often observed were iron sulfide, calcium carbonate, ferric hydroxide, and magnetic iron oxide ($Fe_2O_3.H_2O$). The disks then were wiped free of loose corrosion products and stored in a desiccator over a drying agent until they could be cleaned conveniently.

To clean the disks, they were scrubbed with scouring powder, rinsed in distilled water, and placed for 10 minutes in an electrolytic bath containing dilute sulfuric acid and a corrosion inhibitor. A lead strip in the bath served as a noncorrodible anode; the test specimen, suspended on a wire hook, was the cathode. A 6-volt, 5-amp. current was passed between the electrodes during cleaning. After the electrolytic cleaning, the disks again were scoured, washed in distilled water, rinsed in acetone, air-dried, and weighed. Occasionally a disk that had not been corroded was cleaned in the same manner to determine the weight loss due to cleaning alone. This figure was deducted from the total weight loss of the disks to compute the weight loss attributable to corrosion. The weight loss, in grams per disk, was converted to average penetration in inches per year for the evaluation of results.

Determining Unstable Constituents

Quantitative chemical analyses were made in the field for dissolved oxygen, free carbon dioxide, hydrogen sulfide, pH value, total and dissolved iron, alkalinity to phenolphthalein and methyl orange as calcium carbonate, supersaturation of carbonates as calcium carbonate, residual chlorine, and turbidity. Hardness as calcium carbonate and total chlorides also were determined for identification purposes. Microscopic examinations were made to determine the types and quantities of organic matter present.

Precautions were taken to obtain uncontaminated samples, particularly those to be analyzed for dissolved gases. Samples were withdrawn through a rubber tube extending to the bottom of a glass-stoppered sample bottle. Bottles were rinsed three times with the water to be sampled, a quantity of water approximately equal to three times the capacity of the bottle was permitted to overflow, and the rubber tube then was withdrawn slowly so that the space occupied by the tube was filled by the water.

Determination of dissolved oxygen.—Several methods of determining dissolved oxygen in water, including some colorometric methods, were tested in the field laboratory, but the method finally selected was the iodine modification of the Winkler method devised by Taylor and Christianson.[2] This method is satisfactory for determining dissolved oxygen in samples of water containing hydrogen sulfide and differs from the standard Winkler method in the use of iodine to convert hydrogen sulfide to hydrogen iodide and free sulfur before the addition of the usual reagents.

Determination of free carbon dioxide.—Free carbon dioxide in water was determined by the Betz method,[3] which is based upon the absorption of carbon dioxide by dilute alkaline solutions. The samples were titrated with standard N/22 sodium carbonate solution in the presence of phenolphthalein indicator.

Determination of hydrogen sulfide.—A modification of the method for determining hydrogen sulfide concentration as given in Standard Methods of Water Analysis,[4] using smaller samples and more concentrated iodine and sodium thiosulfate solutions, was used for field analyses.

Determination of pH value.—The pH value of samples was determined by visual comparison of samples containing indicators with permanent color standards in a Hellige comparator in the field laboratory. Results were checked periodically by use of a Beckman glass-electrode meter.

Determination of total and dissolved iron. Several colorimetric methods were tested experimentally for determining iron in water. The method finally selected was developed by the Betz company.[5] This method depends upon acidification of the sample by dilute hydrochloric acid and oxidation of ferrous iron compounds by hydrogen peroxide.

The samples then are boiled to dryness; and distilled water, aluminum nitrate solution, and ammonium thiocynate solution are added, producing the characteristic red color of ferric thiocyanate. The aluminum nitrate reagent forms complex compounds with any complex phosphates or fluorides present, lessening the possibility of low-iron determinations from these sources. Colorimetric comparisons were made by the use of a Klett-Summerson photoelectric colorimeter.

Determination of alkalinity and carbonate stability.—Alkalinity of waters to phenolphthalein, which is caused by hydroxides, plus half the normal carbonates present, was determined by titrating of a 50-ml. sample with 0.02 N. sulfuric acid, using phenolphthalein indicator. The titration on the same sample then was continued, using methyl orange indicator, to determine the total alkalinity of the sample.

Supersaturation of carbonates was determined by comparisons of the methyl orange alkalinity before and after agitation for 5 minutes of a portion of the sample in the presence of an excess of powdered calcium carbonate.

Determination of residual chlorine.—Residual chlorine in water samples was detected quantitatively by adding orthotolidine indicator and the subsequent evaluation of the yellow color by use of a Klett-Summerson colorimeter.

Determination of turbidity.—Turbidity of samples was ascertained by use of a Klett-Summerson colorimeter, using a 420-mμ blue color filter. Readings obtained were compared with values previously determined, using prepared turbidity standards.

Microscopic Examination

Types and approximate quantities of organic matter present were determined by microscopic examination. No bacteria counts were made. The most common types of organic matter found were small crustacea (such as Cyclops and Canthocamptus), algae (particularly green algae), and numerous simple one-celled organisms. Larger animals, such as mosquito larvae, were found in some waters. The presence of sulfate-reducing bacteria in some brines has been reported by other investigators.

Dissolved-Gas Studies

Equipment was constructed in the laboratory, and tests now are being conducted to determine the corrosivity to metal of dissolved oxygen, free carbon dioxide, and hydrogen sulfide in water, in varying concentrations of each gas singly, and in varying ratios of oxygen to free carbon dioxide and of free carbon dioxide to hydrogen sulfide. The effect of different proportions of dissolved oxygen to hydrogen sulfide is regarded as less significant, as little dissolved oxygen usually is found in water when detectable quantities of hydrogen sulfide are present. A flow diagram of the laboratory apparatus used for dissolved-gas studies is shown in Fig. 5.

Experimental Procedure

Two complete series of laboratory tests are planned. In the first series, deionized water will be the corroding medium, and in the second either a synthetic or natural brine will be used. In each series, one complete set of determinations will be made with waters having dissolved-gas contents comparable to those encountered in field tests. The range of dissolved-gas concentrations for oxygen will be from air saturation, which is approximately 9 to 0 p.p.m., for free carbon dioxide from approximately 300 to 0

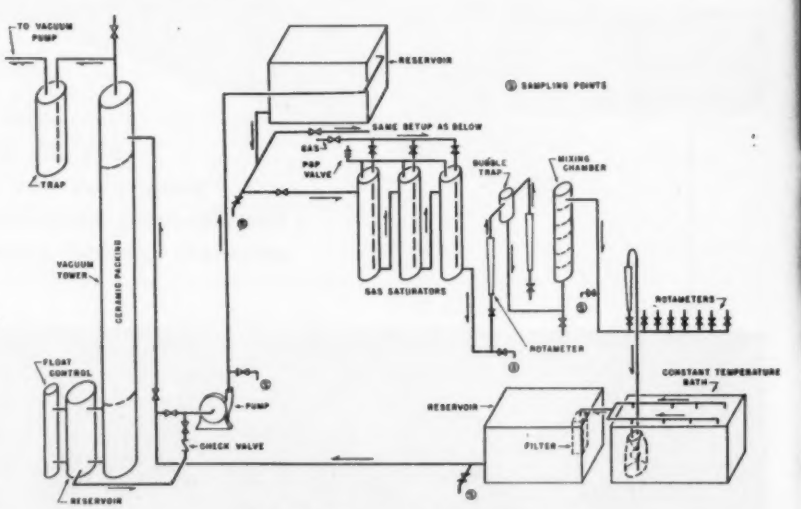
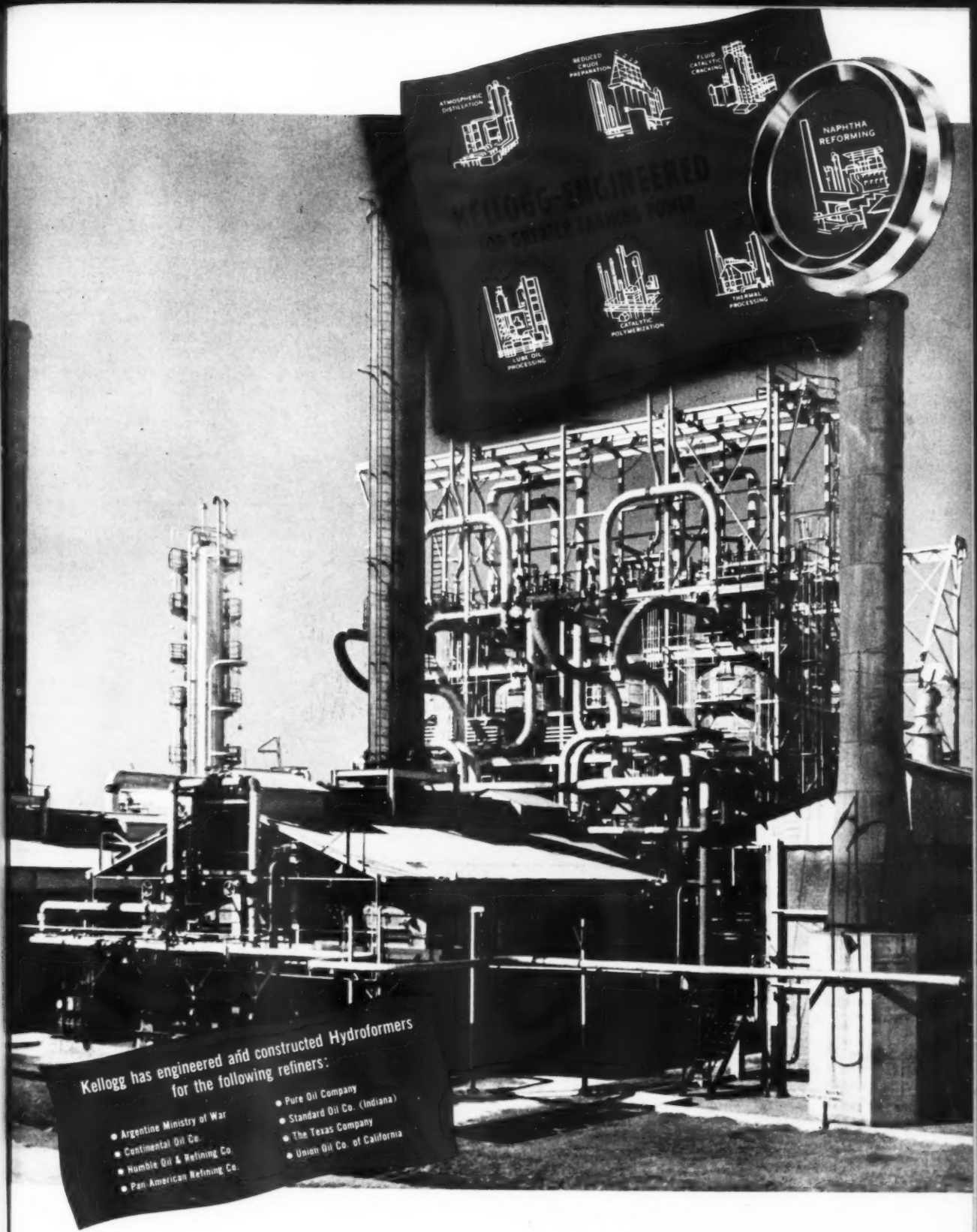


Fig. 5—Corrosion test apparatus.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Historically, Kellogg developed the catalyst used in the Hydroforming process, brought the process itself into actuality through a succession of pilot plants, and designed and erected all but one of the commercial units that were built.

Flexibility of these units was underlined recently when one refiner interested in the petro-chemical market utilized his equipment (without any mechanical alterations) to produce hard-to-get synthetic benzene.

When considering methods for upgrading naphthas or for obtaining certain useful cyclic hydrocarbons for sale in the chemicals market, Kellogg's catalytic reforming experience will prove of value to any refiner.

ACHIEVE NEW STANDARDS FOR AUTOMATIC CONTROL

Kellogg specialists set new standards for ease of operation when the original hydroformer was built ten years ago. Still standing as one of the first units to employ graphic panels, the process also uses master and dormant cycle timers for fully automatic control. Each of the steps comprising one full cycle registers *visually* on the main panel. Audible signalling equipment, to warn of any malfunction, is present, as are push-button controls for manual operation. The job is typical of the controls and instrumentation which go into Kellogg's designs today.

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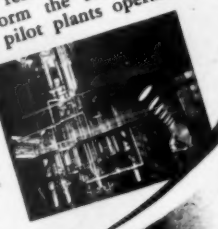
both equipment and people, to improve processing and equipment ideas. Semi-commercial size plants for testing ideas with a limited capital investment have for years been the tools of wise refiners. But Kellogg made a major contribution to refining when, in cooperation with the larger refiners, it created *one-to-two-barrel* units to perform the same job. Today more than twenty such pilot plants operate in Kellogg's laboratories, exploring refinements of existing processes, charting new processing ideas and pinpointing useful data on proposals for which specific commercial operating information is not available.



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p.p.m., and for hydrogen sulfide from approximately 500 to 0 p.p.m. Other tests will be made with different ratios of gases.

The initial test was made with air-saturated water. Dissolved-oxygen content of the water ranged from 7.80 to 8.42 p.p.m., and averaged 8.23 p.p.m. Free carbon dioxide content ranged from 1.5 to 4.0 p.p.m., and averaged 2.26 p.p.m. The iron content of the water used for the test increased from 0.0 p.p.m. at the start of the test to 1.3 p.p.m. at its conclusion as a result of the corrosion loss. Subsequent tests are being made with lower concentrations of dissolved oxygen. Data obtained to date on the effects on corrosion of varying concentrations of dissolved oxygen are shown in Fig. 6.

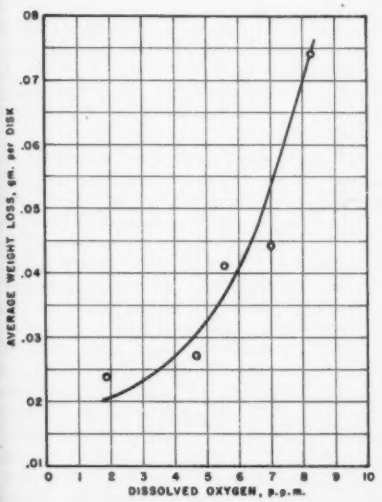

Fig. 6—Oxygen corrosion in deionized water (pH — 6.6).

Other corrosion data that may be obtained with the laboratory apparatus are measurements of the corrosivity and intensity of currents caused by electrolytic cells, set up by bimetallic construction, and by potentials created by changes in fluid velocities. Extended corrosion tests also will be made later, continuing for 72 hours, 6, 9, and 12 days to ascertain whether results of the 72-hour tests may be extrapolated on a straight-line graph.

Some experimental methods of water conditioning will be tested, using the laboratory apparatus. Several tests on the removal of dissolved gases from water by physical and chemical means are contemplated. One method that will be tried is the use of vacuum to remove dissolved oxygen, free carbon dioxide, and hydrogen sulfide from water.

Another method of degasification to be tested is the use of other gases for scrubbing dissolved gases from water. Experiments have shown that nitrogen may be used to reduce the dissolved oxygen concentration and, less efficiently, the free carbon dioxide concentration of water. Other possibilities are the use of hydrocarbon gases, particularly methane, as scrubbing agents.

The use of chemicals to remove dissolved gases, especially in small concentrations, is another method that may be used. There is a possibility of some work with ion-exchange resin beds for degasification and stabilization of carbonate constituents.

All methods studied will be evaluated both as to efficiency and economy. It is likely that the most economical method of removing dissolved gas will be a combination of vacuum degasification followed by gas scrubbing or by the addition of chemicals to reduce the gas concentration to a minimum.

Vacuum deaeration at one plant studied reduced dissolved-oxygen content from the saturation-from-air value (approximately 9.0 p.p.m. at the prevailing temperature) down to as low as 0.75 p.p.m. Sodium sulfite also was added to the water to react with the residual dissolved oxygen. The latter treatment was unsuccessful due to the combination of sulfite ions with calcium ions from the brines treated, resulting in the formation of calcium sulfite, which immediately dropped out as a hard, insoluble precipitate. This

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reaction eliminates the use of sodium sulfite as a reducing agent in waters with high calcium contents unless, by the use of a chemical agent to retard the formation of calcium sulfite or by improved injection methods the sulfite ion can be utilized as a reducing agent. However, it is possible that other reducing agents might be used for the removal of small quantities of dissolved oxygen. Little work of this nature has been done in the Mid-Continent area.

Another method of conditioning water which may be used experimentally is controlled aeration. The addition of a measured quantity of air to water to react with all the hydrogen sulfide and part of the free carbon dioxide present without the usual simultaneous pickup of dissolved oxygen which occurs where an excess of air is used might be one of the most economical means of treating waters containing dissolved acid gases. It has been noted at the time of the field tests and analyses that this condition existed at a few of the plants studied. However, the balance in gas concentrations was due to chance, rather than to design of the treating system. With the usual type of aerator designed to spray water into the air, or to discharge the water over trays or cascades, control of aeration is difficult if not impossible. With an air pump which discharged under the surface of the water, the quantity of air used could be regulated more closely.

The design of the laboratory apparatus also makes it applicable to a study of the reduction in corrosion of metals due to the use of corrosion inhibitors. It is anticipated that other uses for the equipment may arise as more tests are made.

Conclusions

Some general conclusions drawn from the field study follow:

1. It is important to obtain complete, accurate analyses of the water or waters to be injected, also of the interstitial water before a conditioning plant is designed and constructed. The effects of chemical reactions between constituents of any waters that may be mixed either in the injection system or in the subsurface formation should be considered closely, either by hypothetical combination of the constituents, or by actual mixing and analysis of the waters.

2. Many water-flood operators require too few analyses of the waters being conditioned and injected. Analyses to determine pH value, alkalinity and carbonate stability, dissolved oxygen, free carbon dioxide, and hydrogen sulfide if present, should be made at least daily. Total and dissolved iron should be determined at regular but less frequent intervals.

Comparisons should be made, especially between the iron content of the water at the plant and at some of the injection wells most distant from the plant, as the extent of increase in iron content of the water is one indication of the amount of corrosion occurring in the distribution system. If the water is chlorinated, frequent residual-chlorine determinations should be made so that the chlorine residual may be maintained at the desired level.

3. Sedimentation tanks and ponds should be constructed with baffles arranged to give a greater detention time and to permit more complete coagulation and precipitation. In a large tank or pond without baffles, water flows directly from the inlet to the outlet, permitting light solids to be carried over to the filters, resulting in filter overloading.

4. Frequently too little significance is attached to the possibility of the presence of organic matter and its effect in plugging pore spaces. Sometimes it mistakenly is assumed that there is little likelihood of organic matter living in brines.

In certain instances it is known that the presence of organic matter in injection waters was not recognized until an algal scum formed on pond surfaces, or until injection rates decreased or injection pressures increased due to pore plugging from organic sources. In such instances, it usually is necessary to use concentrated doses of chlorine or copper sulfate added to sedimentation ponds, or injected into input wells. This remedial action usually causes large quantities of scum to accumulate in ponds or injection wells, overloading filters and necessitating back-washing of injection wells.

High concentrations of chlorine also are corrosive to metallic equipment. Occasional examinations should be made to detect the presence of organic matter before such extreme measures are necessary.

5. Closed systems are applicable with waters having negligible acid-gas (hydrogen sulfide and free carbon dioxide) concentrations and low iron and suspended solids contents.

6. Corrosion is in general a more serious problem in the Mid-Continent area than plugging.

7. It is desirable and may be possible to use other means of water conditioning than some methods now in general use. There is a wide field for study of the deaeration and degasification of waters, or of controlled aeration. Much laboratory work might be done on the correlation of alkalinity and carbonate stability with the addition of lime or other alkalies.

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Pegasus Drilling

(Continued from page 81)

is encountered at about 11,100 ft. There are two horizons of the chert in the Devonian, the top one of about 95 ft. being separated from the lower 300-ft. zone by a 300 or 400-ft. break of relatively easy drilling dolomite and shale. It is difficult to keep a straight hole in the chert, because high weights are maintained on the bit in order to increase drilling speed. From 6,000 to 7,500 ft. of hole tends to get crooked and to do so rapidly, and if the hole gets off vertical here it is nearly impossible to straighten it after entering the chert. From 18 to 20 drill collars are nearly standard practice to help increase penetration. Reducing the weight on the bit to help in straightening the hole will reduce the drilling rate to almost nothing.

To try to correct this crooked-hole trouble, diamond coring with low bit weights has been tried, and has proved successful to some degree. Diamond washover shoes have been successfully used in fishing jobs in the small holes where there is little clearance between the drilling equipment and the hard bore-hole walls.

One of the new "mud engine" drilling tools was tested in Pegasus chert but the bit trouble that has hampered work with this tool during its past was again apparent here. With regard to coring, a field and operator-wide program is in the formative stages, to supply the engineering committee with more complete information on the field.

Drilling time has varied considerably. The discovery well was drilled in 323 days and one of the development wells was recently completed in 162 days—just one-half a day more than half of the time taken for the discovery well. Average time for completion now, excluding the discovery and one other that took an extraordinarily long time, is 195 days. This time is an average of the drilling times for 11 wells that used many different sizes of bits—illustrated by the three examples given in the drawing.

The average footage per bit through 720 ft. of chert section is 14 ft. An average of 52 bits is used for the whole section.

Drilling Mud

Although mud practices have been nearly standard, some departures from usual practice have been made. Phosphates as mud-treating agents have been used in place of caustic and quebracho, to maintain low gel strengths and increase penetration rates while drilling below 10,000 ft. With these phosphates, pH is nearly

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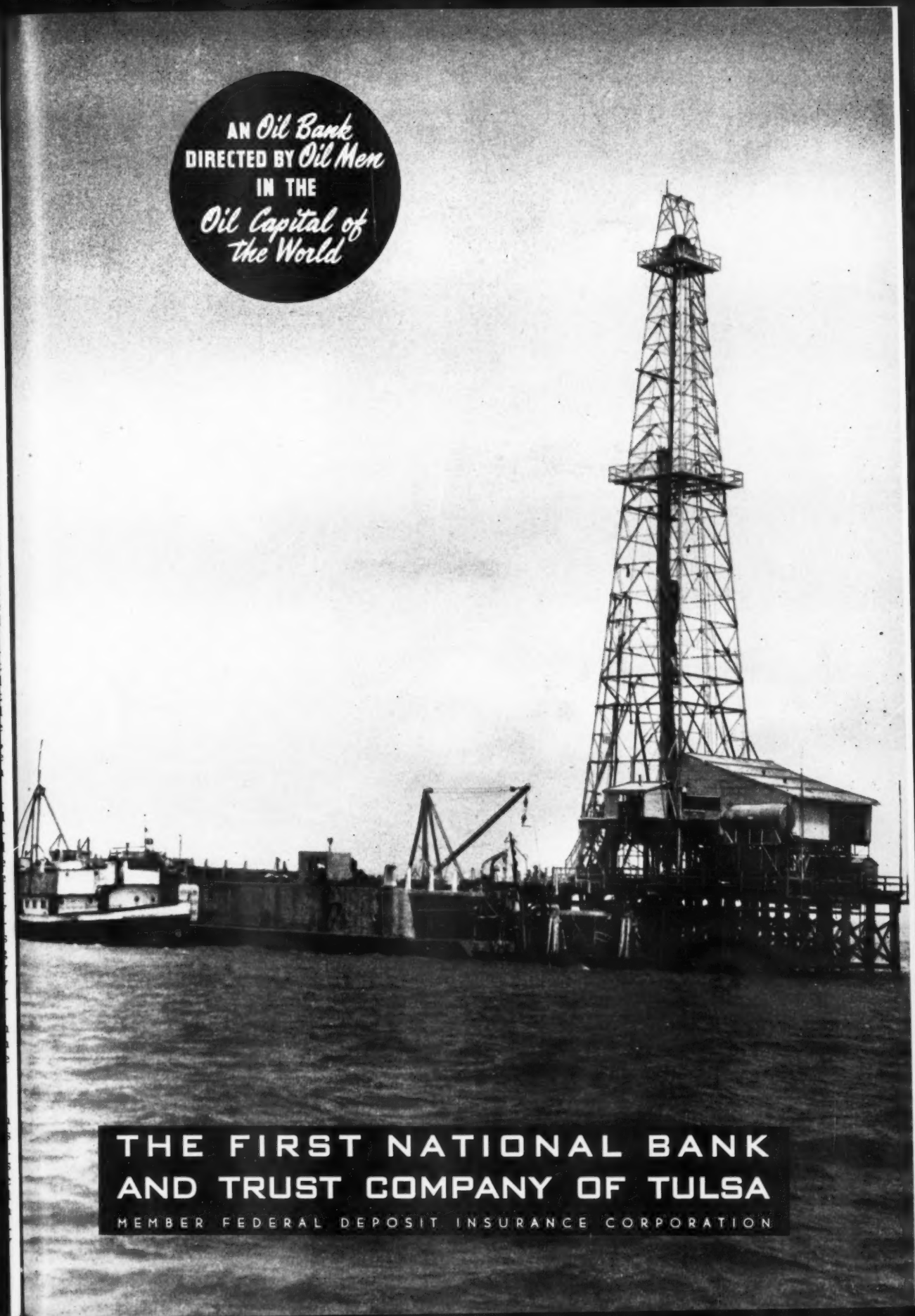
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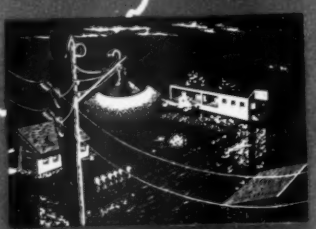

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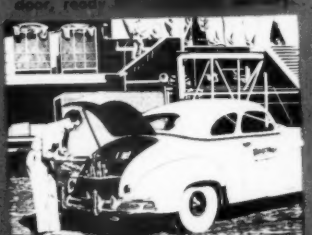

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at the neutral point rather than at 9.5 to 11 as is common with the caustic-quebracho treatment.

Another attempt at increasing drilling speed has been the use of oil-emulsion mud at depths of 10,000 ft. or more. This mud is said to increase bit life and to increase penetration rate.

Several Casing Programs

As shown by the accompanying chart, several casing programs have been tried, and are in use. The ones shown are only examples of various casing sizes that have been used. The extreme depth and the desire for maximum economy in the casing program has caused operators to drill holes with a minimum of clearance between casing and bore-hole and between concentric casing strings. Although rate of penetration decreases with decrease in hole size, the added expense is compensated for by decrease in casing tonnage.

Most operators design the third string of pipe so that the lower portion, from the bottom up into the bottom of the second string, is composed of flush-joint or extreme-line pipe. Except in the three-string program, the hole size below the second string of pipe is so small that standard casing of the desired size could not be run in the third string.

As shown on the drawing by a dotted line, some operators attempt to recover the portion of this third string that is inside the second string of pipe. A backoff joint is placed in the string just above the second-string shoe. This procedure has not been successful in all cases, and it has sometimes been necessary to cut the casing near the backoff joint instead.

The third or fourth string, depending on the kind of program in force, is either set on top of the pay or through the pay, both practices being common. In either case, the casing shoe is well into the Ellenburger since the pay section is below the geologist's top of the formation.

Cementing Problems

Cement, too, has come in for a lot of study in Pegasus. Lost-circulation troubles again plague operators. Sometimes, if the casing is set through the sandy porous zone, the second string of casing is difficult to cement because of lost circulation, and it becomes necessary to use staging collars. But it is in cementing the third string of pipe that the lost-returns problem becomes critical.

Because clearance between the casing and hole wall is small, the use of staging collars is restricted. The lost-circulation materials that are often added to the cement tend to gather around the cementing collars and cause pressure buildup and lost circulation. Even without the collars the annulus is small, and pressures are high.

The method usually used is to pump cement as high as possible around the casing, until circulation is lost. Then the top of the cement is picked from a temperature survey, the casing perforated by a gun or jets, and cement is squeezed farther up the annulus through these holes until the returns are again lost. The process is then repeated. This cement column is carried into the bottom of the second string of pipe, to the point where some operators back off the pipe.

To reduce the lost-circulation trouble as much as possible, operators have added lost-circulation materials to the cement in quantity. Wellite has been used in proportions up to 50 per cent both to reduce lost circulation and to lighten the cement slurry. However, the surest way to get a continuous cement column is probably the perforate-and-squeeze technique mentioned above.

Both operating company and contractors' tools are being used in drilling operations. Contracts are usually written for a depth of 10,000 ft. with day work specified thereafter. However, some contracts are now being written to total depth but these include a chert clause and a lost-circulation clause that guarantee the day-work rate in drilling these zones. Apparently the biggest difference between day work and total depth contracts is a shift in hole responsibility.

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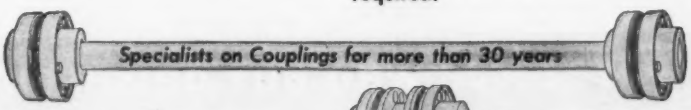

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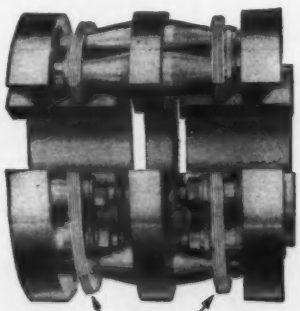

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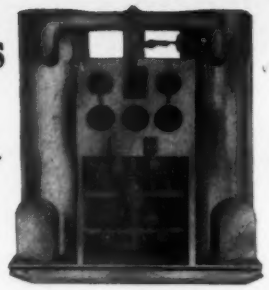

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(Continued from page 87)

more than 3,000,000 bbl. Nearly 2,100,000 bbl. of that capacity is tied into the remote-control system, the remainder, about 940,000 bbl., serving the older Shell line.

The Basin line, entering the terminal from the southwest, functions as a filling or incoming line, while the Ozark system to the northeast is the suction or outgoing line. These operations are diagramed on the instrument panel from which the operations are controlled.

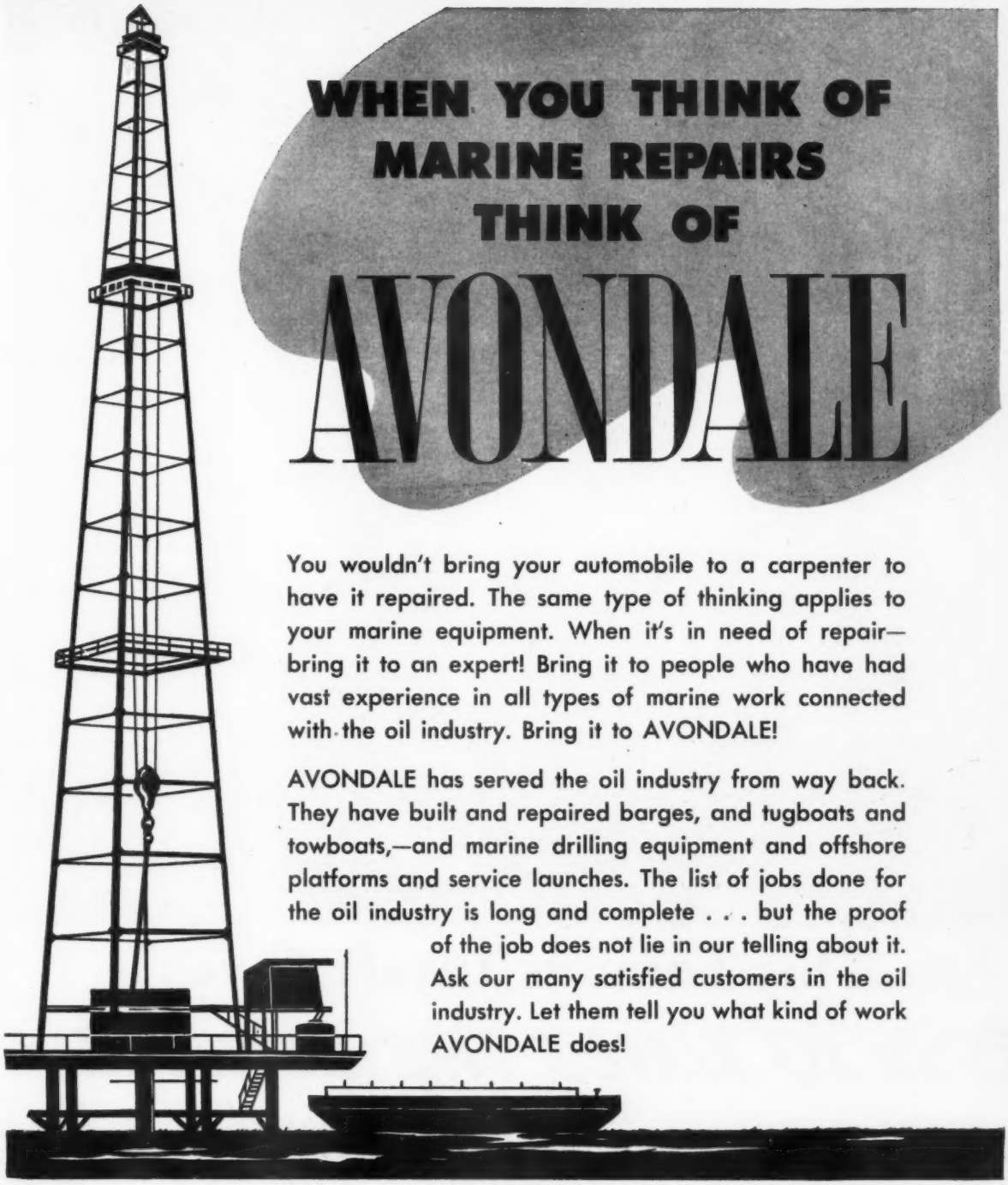
Both the Basin system and the Ozark system lines are equipped with venturi meters located separately in specially constructed buildings. (Photo 3.) In addition to flow measurement data a continuous record is obtained on temperature and gravity of the oil entering the terminal via the Basin system and leaving it by the Ozark system. A small slip stream is run from the line to an Annubis instrument for gravity measurement. Temperature measurement of the main stream is recorded with the same type of instrument commonly used in refineries and gasoline plants.

Instrument panel board.—In addition to the switching control panel, the gager's office building also houses an instrument panel board. (Photo 2.) Located in the same room with the control board, the instrument panel contains seven recording instruments. These instruments produce pressure and flow records on both Ozark and Basin sections of the system. They also record flow and pressures on Shell's 10-in. Wood River line and on the blending operation. A remote flow recorder for Shell's 10-in. McCamey line is installed on the board. The meter run for the McCamey line is more than ½ mile away from the recording instrument.

Warning signals for high and low levels in the central sump and for low suction pressures on Shell's 10-in. Wood River and the Ozark 22-in. lines are incorporated in the design of the instrument board. A warning signal light for high pressures on the Basin System line is also a part of the safety precautions carried out at the terminal.

Tank-farm pumps.—The tank-farm suction header is connected to the suction of a vertical, low-pressure, centrifugal booster pump (Photo 4) which discharges to the suction side of the main-line pumps located about ¼ mile from the gager's building. This pump is remotely controlled by operators in the main-line station. Signal lamps on the gager's control board indicate whether the low-pressure pump is operating or idle. The gagers have no control over this pump.

Large, vertical-type line strainers are installed ahead of the suction of



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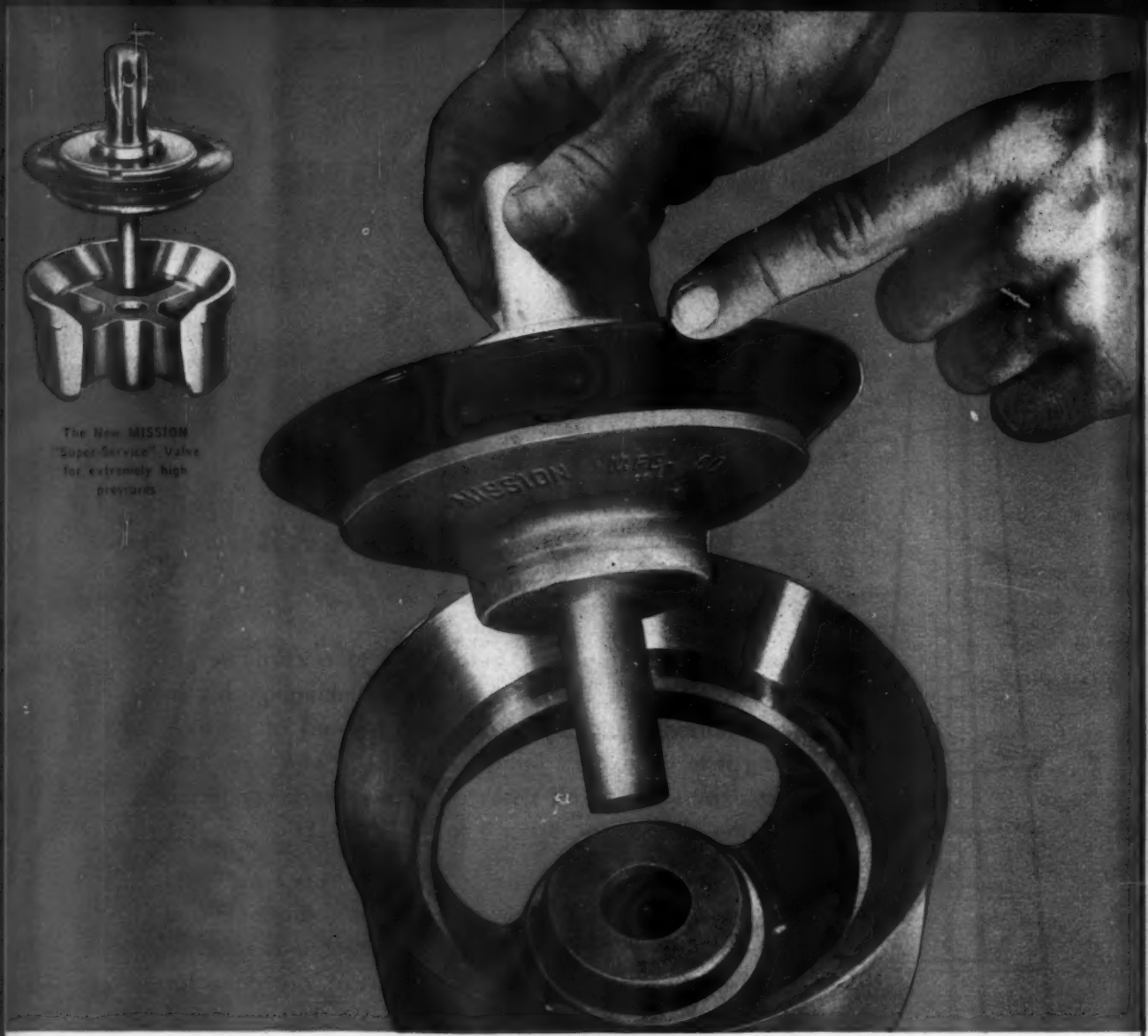

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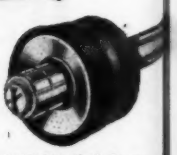

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the booster pump. The strainers are designed so that the filtering element may be renewed simply and quickly. Equipped with a removable head similar to that of an ordinary heat exchanger, the line strainers are installed below ground level with only the removable head and a small section of the body extending above grade. If necessary, the entire strainer may be removed since it is located in a concrete-lined pit, as are the low-pressure pumps. The entire working area around the pumps and strainers is slabbed over and the pits are connected to a common sump. Cranes operating on a structural-steel frame built over the pump and strainer working area speed up maintenance and repairs.

Certain batches shipped to Wood River by Shell are made up of blends of several grades of Mid-Continent crude oils. To insure suitable mixing of the streams on delivery to the main line, and accurately to control the percentage blend, auxiliary pumps are used to inject the low-percentage crude into the high-percentage crude.

Flanges

(Continued from page 91)

rangement resulting in the bolts being in compression instead of tension. This arrangement permits much higher bolt loading which is advantageous where large diameters at relatively high pressures are involved. Another advantage is a saving in time required for disassembling the joint.

For pressures above the range of the A.S.A. 2,500-lb. standard one outstanding joint has been developed. This joint consists of a high-tensile-material flange which is screwed on the pipe with the pipe ends projecting through the flanges. A plate gasket is used between the pipe ends. Bolting through the flanges forces the pipe ends into the gasket plate to form a joint. The gasket plate is machined differently from the pipe end. This shape combination allows for some misalignment in the joint without danger of leakage. As these flanges are not attached by welding, both pipe and flanges can be of higher-tensile material than would be possible to permit welding. Bellows lens gaskets utilize internal pressure to aid in sealing and correcting for misalignment—in effect a self-sealing joint. This type of joint in general provides a small contact area which in turn means higher gasket unit seating pressures with lower bolt loading.

Flange Facings

The subject of flange facings and gasket application is covered only generally here. Actually gasket material and design are just as important to a satisfactory joint as is the basic flange type.

Some of the general factors involved in gasket selection are:

1. The material must be softer than the flange face so that plastic deformation, sufficient to correct for minor irregularities and roughness, will take place in the replaceable gasket rather than in the flange material.

2. It must be sufficiently elastic to insure a continuously tight joint with reasonable temperature changes, minor misalignment, and nominal external piping stresses.

3. The material and gasket area must be so balanced that necessary plastic deformation can be obtained with a reasonable bolt load.

4. It must have sufficient tensile strength or the flange facing be such as to prevent physical displacement (blowout) of the gasket due to internal pressure.

5. Cost must be low relative to other components of the piping system as the gasket is replaced more often than any of the other components.

6. Gasket design must be such that required flange facing can be provided without undue damage to or increased cost of the flange itself.

In addition to the limitations outlined in Fig. 2 it is well to remember that the A.S.A. ratings are nonshock only. Codes in general do not specify allowance to be made for shock or

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vibration as these are factors dependent entirely on circumstances of application. As such they must be considered individually by the designer.

When flow of a fluid is stopped abruptly the shock pressure may be 40 to 60 times the velocity in feet per second. For example, if a factor of 50 is used on a line operating with a velocity of a 10 ft. per second, the shock pressure will be in the order of 500 psi. plus static line pressure. This factor must be considered in design if excessive stresses on flanges and valves are to be avoided.

In the lower pressure ranges the A.S.A. 150-lb. flange is proportionately the weakest of the group. Theoretically the series is good for the pressure-temperature relationship given in the code. However, actual practice has shown that additional limitations are necessary. Most valve manufacturers will not recommend their 150-lb. valves for operations in excess of 500° F. at any pressure. The 500° F. temperature limit is also the usual temperature limit on gasket specifications. When used with high-temperature gasketing the flange is definitely weak.

Only four bolts are used in the 2 and 3-in. sizes in the 150-lb. series. Apparently this bolt spacing is such that excessive deflection occurs to such an extent in the flange in the area between bolts that a tight joint cannot be assured. Many designers substitute 300-lb.-rating flanges in this size to overcome this objection. This is especially good practice at pressures in excess of 175 psi. or where external line stress may be unusual.

Flange facing is of course tied very closely to gasket specifications but in considering the physical properties of flange types and their application it is necessary to take facing into account. The common flange facings are as shown in Fig. 3.

The flat-faced steel flange would normally be used as a companion to a cast-iron integral flange on equipment. Flat facing of the companion flange in this instance tends to reduce stresses on the cast-iron flange and provides some protection against breakage from high bolt loadings, as it is normally used with a full-face gasket.

A 1/16-in. raised facing is usually supplied for steel flanges within the A.S.A. 150-300-lb. classes where a flat-type gasket is to be used. The raised face is increased to ¼ in. in 400-lb. and higher class flanges. Plain or raised facings should not be used for temperature over 750° F.

Lap-Joint Stubs

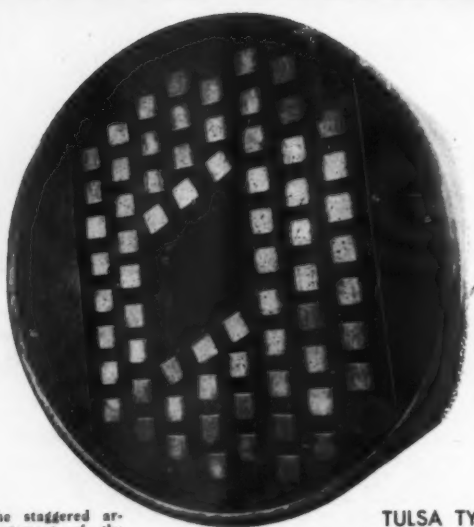
Lap-joint stubs are normally upset to a diameter the same as the normal raised-face diameter; however, on special order any other facing can be machined into the upset face.

Large male and female facing was the first answer to a means of confining flat gaskets to prevent blowout at higher pressures. The male raised face is again the same as the normal raised-face flange with the female flange being slightly larger and serving as a retainer for the gasket. This type facing is limited to 300 psi. when temperature exceeds 900° F.

Ring-type joint facing using ring groove of different contour from ring gasket is now used almost universally for high-pressure applications. The steel ring compressed in the flange groove is positive blowout protection. The gasket contact area is reduced so that lower bolt loading will provide suitable compression.

Large tongue-and-groove facing is very similar to large male and female facing, both in design and application, and is seldom used except for special application. It confines the gasket on both external and internal edges.

The small male and female and small tongue and groove have the same features as the large design previously mentioned; however, the gasket area is greatly reduced, giving a much higher gasket compression factor with the same bolting. These flange facings have not found wide application.



The staggered arrangement of the bubble caps prevents channeling of the liquid on the tray.

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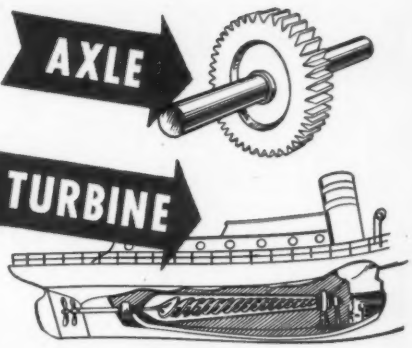

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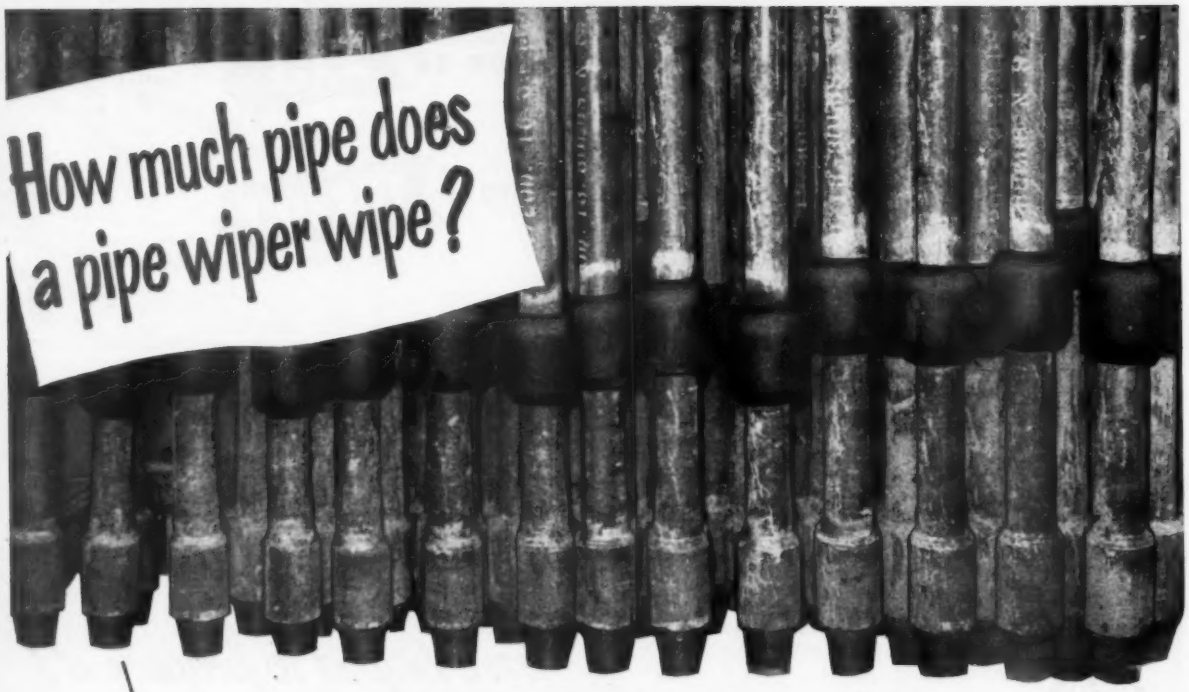

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QUESTIONS on TECHNOLOGY

by W. L. Nelson
Consulting Engineer

Technical Books Or Literature

Although we have heretofore been associated with the production side of the business, we are now operating a small refinery. What is there in the way of textbooks or other literature that will help us with technical matters? W.F.

To recommend books or technical literature is more difficult than it would appear. Books that can be readily understood tend to impart only a "talking knowledge" which is of no real practical value whereas books that impart practical facts are usually highly technical and require a background of experience that is seldom available. There seems to be no middle ground. The question has arisen repeatedly in The Oil and Gas Journal.

1. August 31, 1939.—A Small Library of Petroleum, page 52. This lists books and references pertaining to the following topics: Abstracts and Indexes, Trade Publications, Testing Methods, Utilization of Oil, and Technical and Scientific.

2. September 2, 1944.—Natural Gas Books, page 50.

3. April 13, 1946.—Books for Plant Workmen.

In addition, there have been numerous listings on the Questions on Technology page of references, mainly about the utilization of products.

All of this information cannot be repeated or even summarized here, but here are certain major fields with the title of one representative book for each field. No claim is made that the books listed are the best in their respective fields.

1. **Bibliography.**—Hardewicke, R. E.: "Petroleum and Natural Gas Bibliography," University of Texas, Austin, 1937. (1397 books, etc., listed.)

2. **Historical.**—Day, D. T.: "Handbook of the Petroleum Industry," 2 volumes, John Wiley & Sons, 1922. (Some construction detail still useful.)

3. **Workman Knowledge.**—Petroleum Educational Institute: "Simplified Petroleum Chemistry and Physics," 704 Spring Street, Los Angeles, 1943, 122 pages.

4. **Laymen.**—Hager, D.: "Fundamentals of the Petroleum Industry," McGraw-Hill Book Co., Inc., New York, 1939, 445 pages.

5. **Safety.**—Armistead, George, Jr.: "Safety in the Petroleum Refining and Related Industries," John G. Simmonds & Co., 111 John Street, New York 7, 1950, 416 pages.

6. **Operation and Design.**—Nelson, W. L.: "Petroleum Refinery Engineering," third edition, McGraw-Hill Book Co., Inc., New York, 1949.

7. **Routine Tests.**—A.S.T.M. Committee D-2 "Petroleum Products and Lubricants," A.S.T.M., 1916 Race Street, Philadelphia.

8. **Natural Gas.**—Huntington, R. L.: "Natural Gas and Natural Gasoline," McGraw-Hill Book Co., Inc., New York, 1950, 598 pages.

9. **Technology.**—Gruse and Stevens: "The Chemical Technology of Petroleum," second edition, McGraw-Hill Book Co., Inc., New York, 1942, 733 pages.

10. **Hydrocarbons.**—Brown et al.: "Natural Gas and Volatile Hydrocarbons," Natural Gasoline Association of America, Kennedy Building, Tulsa, 1948.

11. **Treating and Dewaxing.**—Kalichevsky and Stagner: "Chemical Refining of Petroleums," Reinhold Publishing Co., New York.

12. **Lubrication.**—Forbes, W. G.: "Lubrication of Industrial and Marine Machinery," John Wiley & Sons, New York, 1943, 319 pages.

13. **Asphalt.**—Abraham, H.: "Asphalts and Allied Substances," fifth edition, D. Van Nostrand Co.

14. **Bureau of Mines.**—"Selected List of Publications Dealing With Petroleum, Natural Gas, Helium, Oil Shale, and Allied Substances," and Supplementary Lists, Bartlesville, Okla.

15. **Inspection.**—"Measuring, Sampling, and Testing Petroleum Shipments," Standard Inspection Laboratory, Standard Oil Development Co., New York.

16. **Comprehensive.**—Dunstan et al.: "Science of Petroleum," four or more volumes, Oxford University Press, New York, 1938 and later dates.

Liquid Volume of Noncondensables

In running a Pod analysis, a figure is obtained for noncondensable gases. What is the ordinary figure used for cubic feet of vapor at 60° F., at atmospheric pressure, per gallon of liquid for nondensable gases?—R. T. M.

It is not common practice to convert noncondensable gases to the liquid state. It is assumed that oxygen, nitrogen, and hydrogen are classed as noncondensable. There is ordinarily no reason to convert to the liquid volume basis those materials that contain noncondensable gases. They can be handled most easily on a gas or mol volume basis.

However, the specific gravities (60/60) of the various hydrocarbons are stated officially by the Natural Gasoline Association of America (Standard 2145 Standard Table for Physical Constants for the Paraffin Hydrocarbons), and the California Natural Gasoline Association concurs (Bulletin TS-401, second edition). The relation of gas volume to liquid volume by this authority is shown in Table 1 which also includes by computation the factors for converting cc. of gas to cc. of liquid.

The apparent density of hydrogen when dissolved at 60° F. would seem to be lower than the 0.3 suggested for methane, and the apparent density of oxygen and nitrogen would seem to be somewhat the same as the value for ethane. The densities of liquid olefins (ethene, propene, etc.) are generally higher than the densities of the corresponding olefins (Petroleum Refinery Engineering, page 152, third edition, McGraw-Hill Book Co., Inc., 1949).

A hypothetical situation somewhat similar to this question is the volume of the gases produced during cracking when these gases are dissolved in the material issuing from the cracking still. A somewhat standard usage is a density of 3 lb. per gallon for such gases (Petroleum Refinery Engineering, page 602, third edition).

Stability of Jet Fuels In Storage

Are there any data on the gum stability of jet fuels?—F.R.P.

Jet fuels containing the allowable 5 mg. of inhibitor per 100 ml. appear to be stable up to even 18 months of storage under desert conditions, and by accelerated laboratory tests. Conventional gasoline antioxidants are somewhat effective particularly during the first 6 months of exposure. For complete stability, special additives such as the experimental du Pont PL-122 must be used. The situation has been investigated experimentally by the Aviation Fuels Division of the C.R.C. Coordinating Fuel and Equipment Committee, and the results are available in C.R.C.-244 "1945 Desert Storage Tests on Stability of AN-F-32 Aviation Fuels." The report is available from the S.A.E. Special Publications Department ($1.50), Soc. of Automotive Engineers, 29 West 39th Street, N. Y. 18.

TABLE 1—CONVERSION OF GAS VOLUME TO LIQUID VOLUME

Hydrocarbon—	Sp. gr. 60/60	Lb. per gal. at 60° F.	Cu. ft. vapor per gal. liquid	Cc. liquid 60° F. per cc. gas at 760 mm. at 0° C.
Methane	0.3*	2.5*	59.00*	0.00239
Ethane	0.374	3.11	39.35	0.00359
Propane	0.508	4.23	36.45	0.00388
i-Butane	0.563	4.69	30.65	0.00461
n-Butane	0.584	4.86	31.79	0.00444

*Apparent values for dissolved methane at 60° F.

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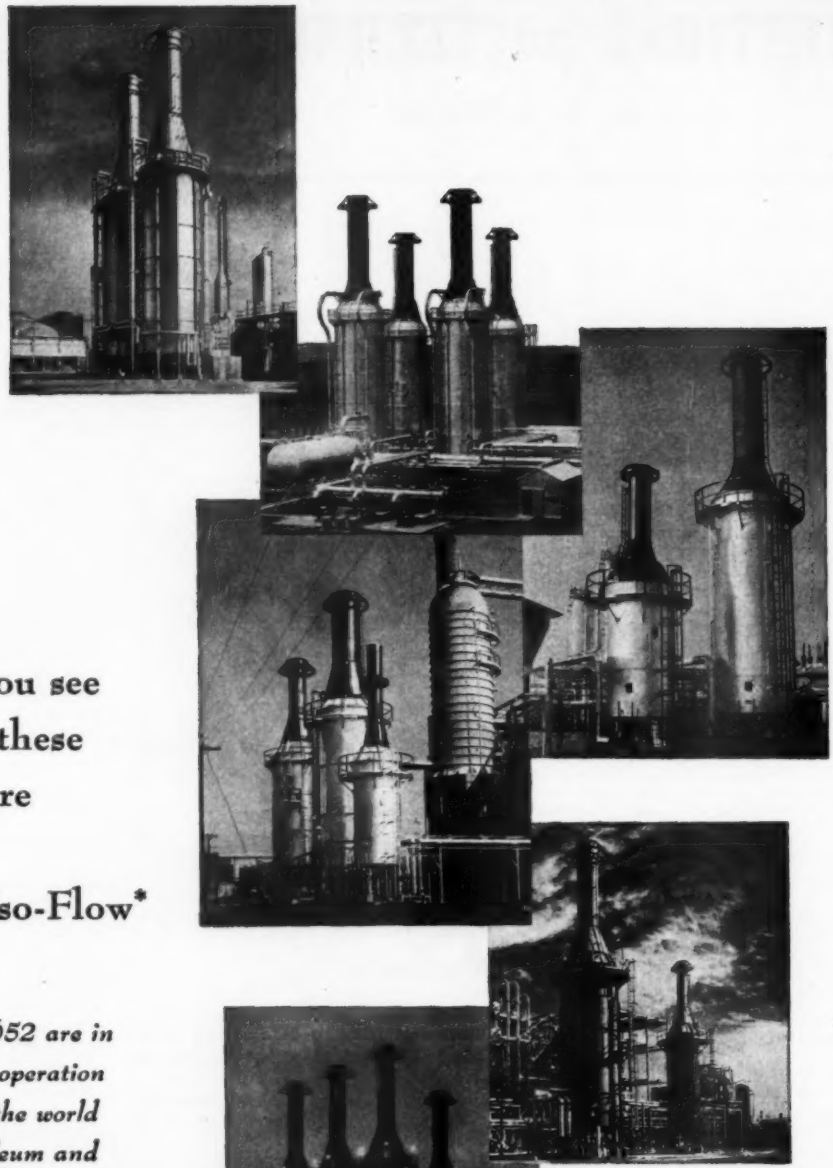

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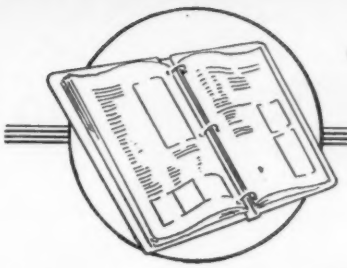

THE REFINER'S notebook

Instrument Settings

PRESENT-DAY refinery units are built for flexibility. Accordingly, controllers are provided with manual adjustments to obtain the wide range of response that is required for changing conditions in a given installation. Instruments must be adjusted on a particular unit at startup. While the unit is on stream additional adjustments may be necessary. There may be changes in the process due to deleterious effects in related equipment, such as scaling or carbon deposition in exchanger tubes resulting in changing rate of throughput and heat transfer. Control valves may behave differently at light and heavy loads, depending upon their characteristics and the particular process.

Manual adjustments.—Most efficient operation is obtained when the controller is properly adjusted or "tuned in" to the process so that changes in air output pressure and rate of valve opening are synchronized to variations in the process and changes in controlled variable. Proportional controllers are provided with an adjustment for **throttling range** or **sensitivity.** Proportional-plus reset instruments have, in addition, an adjustment for **reset rate.** If derivative or rate action is included a third adjustment may be provided for **rate time,** although some controllers with rate action require only two adjustments. Still other manual settings are provided where ratio or metered control are employed.

Proportional control.—A basic action incorporated in pneumatic controllers is that of proportional response. In this connection the terms "set point" and "control point" were introduced previously. It was noted that load change with a proportional controller results in shift or offset from the set point or desired value of the controlled variable. The index or pointer of such a controller is set at the desired value on the chart. With the process in equilibrium the recording pen and pointer coincide. Upon change in the controlled variable the pen will move away from the pointer. In proportional action the change in air output pressure to the control valve is proportional to the amount of pen movement or offset of the controlled variable from the desired value.

Sensitivity.—The amount of offset in a proportional controller depends directly on the magnitude of load change and the throttling range. It depends inversely on the sensitivity. Instrument **sensitivity** is the reciprocal of throttling range and is the amount of change in air output pressure per unit movement of the pen (psi. per inch.). **Throttling range** or proportional band, as explained in other installments, is commonly expressed as the percentage of full pen movement on the chart required for full movement of the valve, from wide open to completely closed. Sensitivity may also be defined as the ratio of the magnitude or amount of valve movement to that of pen movement. An on-off controller has a very narrow band or high sensitivity which is fixed. A proportional controller may have an adjustment for throttling range or for sensitivity directly.

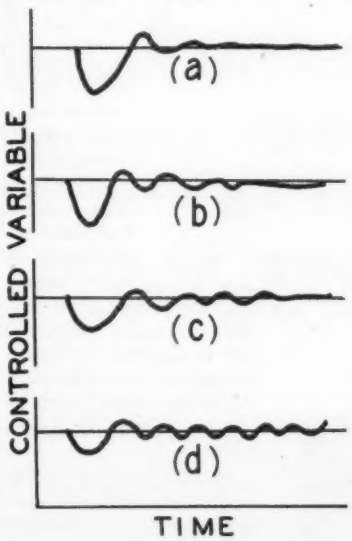

Fig. 1—Adjustment of throttling range. Sensitivity is being increased (throttling range being reduced) in going from (a) to (d). Too low sensitivity is indicated at (a). Tendency toward cycling is shown at (c) with continuous cycling taking place at (d). Optimum adjustment for throttling range is between (a) and (b).

Some comment has been made (Refiner's Notebook No. 27) on effect of wide and narrow throttling band. In general a wider band means greater offset. Too narrow a throttling range may result in cycling. In making the throttling-range adjustment a recommended procedure is to start at a high value of throttling range (low sensitivity), then to narrow the band (increase sensitivity) in successive increments until continuous cycling occurs, as indicated by the series of curves in Fig. 1. The sensitivity is then lowered to obtain optimum setting. In Fig. 1 the optimum setting is between curves (a) and (b). The curve (a) indicates too low sensitivity. Tendency toward cycling is shown by curve (c) and cycling is continuous in (d).

Proportional-plus reset control.—Offset due to proportional action is eliminated by addition of floating action with automatic reset. The proportional-plus reset controller acts to bring the pen and pointer together but the output pressure to the control valve is changed. The **rate** of change of air output pressure is proportional to the amount of deviation of the controlled variable. The additional adjustment involved is that for **reset rate.** This refers to the **rate** of valve movement per unit movement of the pen. Reset rate is defined as: (1) the number of times per minute that the floating action duplicates the proportional action after any instantaneous change in the controlled variable, or (2) the change in air pressure to the valve, in psi. per minute, caused by a sudden change of 1 psi. in throttling (initial) pressure. Reset rate is therefore expressed as a number per minute.

Determination of optimum reset rate and further discussion of instrument settings will be taken up in the next installment of Refiner's Notebook.

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2 CLIMAX CONTROLS is an elaborate catalog on industrial controls for oil, gas, chemical, process, power, and heating installations. The book is sectionalized in the following general headings: drains or vent traps, liquid-level controllers, float-operated level controllers, diaphragm control valves, self-operated regulators, auxiliary regulators, relay regulators, pilots and controllers, miscellaneous equipment, and engineering data and charts. *Climax Control Division, Black, Sivalls & Bryson, Inc.*

3 INDUSTRIAL THERMOCOUPLES. Designated as industrial section 22, this brochure covers standard models of thermocouples for all pyrometers. Protection tubes and other accessories are also covered. *Thermo Electric Co., Inc.*

4 APTITUDE TESTS, a pocket-size folder, explains a packaged aptitude testing program for stenographers, typists, and office clerks now in use by many companies. Particularly stressed is the practical nature of the test. *Martin Publishing Co.*

5 D E L PROTECTIVE COATINGS, is a folder and insert sheets describing coatings and primers especially adapted to metal surfaces exposed to corrosion due to acids, alkalies, alcohol, oil, gasoline, salts, and water. Price list is included. *David E. Long Corp.*

6 LINE SCALES, a four-page, two-color folder describes special features and illustrates and includes prices of nine line scale models ranging in capacity from 40,000 to 500,000 lb. *Line Scale Co., Inc.*

7 FLEXIBLE COMPRESSION FITTINGS. This 12-page, fully illustrated booklet features four styles of advanced-type compression fittings for joining pipe without threading. Complete specification and dimension tables are included. Styles described are for copper tubing, heavy-duty use, steel piping under 2 in., and piping larger than 2 in. in diameter. *Dresser Manufacturing Division.*

8 OIL-FIELD PUMPING ENGINES, a 16-page brochure, printed in two colors, discusses problems involving power in pumping oil wells. In tabular form, complete dimensions, specifications, and engineering data are shown on a line of five models ranging in horsepower from 13.6 at 1,800 r.p.m. to 49 at 1,500 r.p.m. *International Harvester Co.*

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10 MICROWAVE COMMUNICATIONS SYSTEMS. An eight-page brochure describes microwave communications systems and pulse amplitude modulated (P.A.M.) multiplex terminals. Both equipment and typical installations are illustrated. *Philco Corp.*

11 LAYKOLD EMULSIFIED ASPHALTS, a four-page folder, describes a waterproofing and protective coating product made of pure refined asphalt in emulsified form, ready for immediate use without heating. *American Bitumuls Co.*

12 BOILER FEEDWATER CONTROL is a new bulletin describing and fully illustrating the one, two, and three-element boiler feedwater control system. A comparison of the three systems and the advantages of each are featured in this eight-page brochure. *Republic Flow Meters Co.*

13 BULLETIN NO. 21 deals with bubble caps, bubble trays, and tubes and tube assemblies fabricated from a complete list of alloys. Engineers' drawings and data tables show complete information on design and specifications. Bulletin also lists a multitude of other process equipment made and carried in stock or made to order. *Pressed Steel Co.*

14 TYPE "X" EXPLOSIONPROOF PROPELLER FANS is an illustrated data sheet covering pertinent information on eight models with one and three-phase motors, all suitable for horizontal or vertical operation. *Ilg Electric Ventilating Co.*

15 SILVER FOX STAINLESS STEELS. Data tables in this 16-page book cover range of stainless steels, resistance to corrosion, welding, brazing and soldering, hot working and heat treatment, descaling, polishing, pressing, deep drawing, spinning, machining, physical properties, sizes, and sheet weights. *United Steel Cos., Ltd.*

16 TYGON CORROSION-RESISTANT PAINT tells where and where not to use Tygon paint. The 12-page multicolor book carries corrosion-resistant tables, based almost entirely on field experience. *U. S. Stoneware Co.*

17 WORM GEAR SPEED REDUCER BULLETIN covers all the latest revised A.G.M.A. horsepower ratings. It describes how IMO-De Laval worm gears are manufactured, lists types of speed reducers, selection tables, horsepower ratings, overhung load rating tables, dimension tables, and a section describing vertical speed reducers for cooling-tower service. *De Laval Steam Turbine Co.*

18 LAYNE SHORT-COUPLED SERVICE PUMP. Contains cutaway drawings of pump bowls and discharge column. Sixteen sketches show the vertical turbine pump applied to river and relift service, boosting, recirculation, cooling tower, drainage, gas and oil pumping, and fire pumps. *Layne & Bowler, Inc.*

19 FLANGED AND DISHED HEAD CATALOG was published as an aid to the engineers, designers, and others who deal with the fabrication of fired and unfired pressure vessels and tanks of various designs. It contains comprehensive information on flanged and dished heads, flue holes, manholes, handholes, saddles, and fittings as well as a section of engineering data for convenient reference. *Worth Steel Co.*

20 AUSTIN LOADSTAR is a four-page, multicolor booklet illustrating the features of six-cylinder, 2 to 5-ton trucks. Complete specifications are listed on the back cover. *Austin Motor Co., Ltd.*

21 FORGED STEEL UNIONS AND VALVES. Illustrates a complete line of hot forged steel unions and valves and includes complete data, specifications, and prices. Featured are standard and double extra-heavy hot forged steel unions as well as orifice, male and female, lug nut, and full stainless steel and full alloy steel unions. In addition to picturing single-union swing-check and spring-controlled check valves, the new catalog incorporates complete information on a new double-union full-opening swing check valve. *Catawissa Valve & Fittings Co.*

22 MULTISTAGE TURBINE. A new 12-page booklet illustrated with photos and drawings, data on casing, lagging, blades, nozzles, wheels, shafts, diaphragms, bearings, interstage and end glands, governors, synchronizers, governor valves, steam strainers, nozzle control valves, sliding feet, auxiliary oil pumps, and lubrication. *Terry Steam Turbine Co.*

FOR MORE INFORMATION . . . . use one of these cards

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Corresponding to new equipment items or trade literature abstracts in the Oil and Gas Equipment Digest of The Oil and Gas Journal, Aug. 17, 1950

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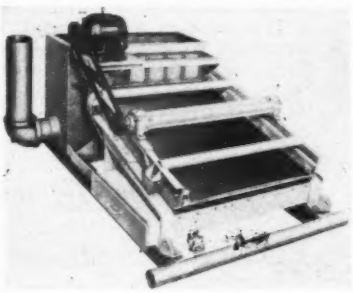
OIL AND GAS EQUIPMENT Digest

IT'S NEW CHECK IT

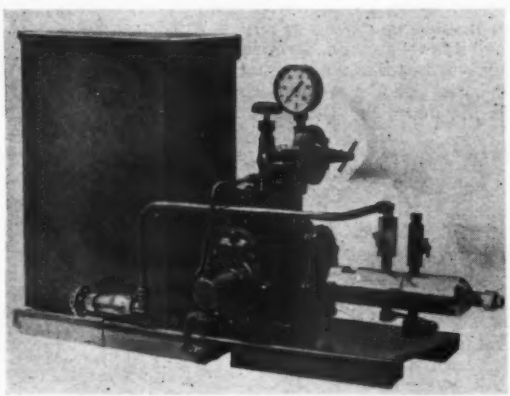
by Dan B. Miller

23 SHALE SHAKER, MODEL 49. Significent features of the new shale shaker are greater strength and rigidity in the screen box; adoption of sheer rubber mountings; and a corrosion - resisting coating. Greater over-all rigidity and strength have been obtained by fabricating the screen deck as a sturdy separate unit which is welded to the side plates. The use of rubber mountings in shear as the isolating medium has improved the screening operation by restricting motion at resonance and transmitting less vibration to supports, thereby assuring lower maintenance and longer life. Furnished in single or dual units, with or without intake mud boxes, in a range of sizes and modifications to suit any operating condition. *Link-Belt Co.*



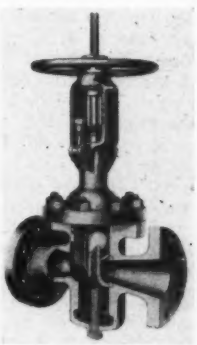
IT'S NEW CHECK IT

24 NEW TYPE OF CHEMICAL-INJECTOR PUMPING UNIT, designed specifically for use by refineries, the oil industry, and chemical plants, is comprised of a four-cylinder, rotary-type, crankshaft motor with an injector unit. The motor is flooded by an oil pump, all parts of which operate in a complete oil bath. It will operate on air, gas, or any liquid-type pressure, on pressures from 1 to 75 lb. The injector is of the plunger type and as many as three injectors may be used on one motor. Each injector is controlled individually. One injector can pump 1 oz. while others may pump from 1 oz. to 50 gal. in 24 hours. Chemicals touch only stainless steel or other metals not affected by chemicals used. *McFarland Engineering & Pump Co.*



IT'S NEW CHECK IT

25 VENTURI BALL VALVE. The new valve is especially designed for throttling applications in high-pressure, corrosive, or erosive applications and features straight-line discharge characteristics. In the throttling position, the ball presents a smooth surface, and nonturbulent flow is possible over a wide range without destructive erosion or wire drawing. Wide-open flow is unobstructed and nonturbulent with negligible pressure drop. When closed the ball seats tightly regardless of pressure and flow conditions. Line contact between ball and seat assures tight, absolute shutoff. It is self-cleaning and purging due to the venturi design. Liquids or gases passing through the venturi passage suck out dirt, scale, and sediment. Ball seats in a different position each time, distributing wear over its entire surface. There are two seats and the valve may be reversed in the line to double its useful life. *W-K-M Co.*



IT'S NEW CHECK IT

26 VERTICAL TURBINE PUMPS. Capacities from 50 to 15,000 g.p.m. are available. The new models develop maximum performance per size and overlapping coverage allows selection of a unit for nearly any capacity and head condition at peak efficiency. Incorporated in the line are extra-size bearings of special ma-

The Oil and Gas Equipment Digest presents a review of what is new in equipment and trade literature . . . makes it possible for readers to obtain full information on every subject by use of convenient "Check It—Mail It" service card. This periodic feature of The Oil and Gas Journal will include all that is new in equipment . . . at a time when new products are being introduced, and existing products improved.

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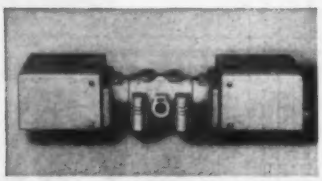
terials for long life; shaft seals where required; enclosed impellers throughout; wearing rings; flanged and bolted bowl construction. Either oil or water-lubricated pumps are available from various stock locations, arranged for motor drive, right-angle gear drive, or belt drive. They are suitable for a wide variety of services, including installation in industrial and municipal water supply for installation in sumps, tanks, reservoirs, or streams, for pumping water, refinery products, and other liquids. *Worthington Pump & Machinery Corp.*

IT'S NEW CHECK IT

27 HEAVY-DUTY SUBSURFACE PUMPS are especially designed to be set at 5,000 ft. and deeper. The major feature of the pump is a double-thick wall for the barrel tube giving extra rigidity, allowing plunger to stroke freely without binding due to flexing or bending of the pump barrel. The one-piece construction eliminates extra joints. Equipment is marketed in two styles of pumps; Tuff-Temper, which has a heat-treated, one-piece honed barrel with a hard chromium-plated plunger for extra-long performance and for corrosion resistance, and the Precision pump, which has sectional metal plungers which work in a high-grade alloy steel, one-piece barrel tube. Both pumps are available in 1⅞ and 1¼-in. bores for 2-in. tubing, and 1½ and 1¾-in. bores for 2½-in. tubing. *Harbison-Fischer Manufacturing Co.*

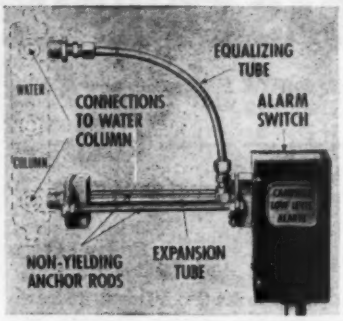
IT'S NEW CHECK IT

28 DOUBLE SOLENOID HYDRAULIC VALVE. A new double solenoid operated, four-way hydraulic valve, series 5500 is designed for use as a semiautomatic electric control of a hydraulic circuit. Located at each end of the valve body, the two solenoids are continuous-duty push type. Energizing the solenoid on the right moves the valve piston to the left, and vice versa. Principal feature in the new design is the hydraulically balanced piston which has an integral spool and stem. Designed for pressures up to 1,500 psi., it is available in sizes: ¼, ⅜, ½, ¾, and 1-in., for standard 110, 220, and 440 volt, 50 or 60 cycles. Nonstandard current specifications furnished upon request. *Rivett Lathe & Grinder, Inc.*



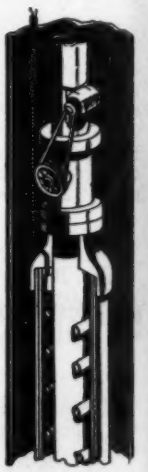
IT'S NEW CHECK IT

29 MICROTHERMAL, LOW-LEVEL BOILER ALARM. A super-sensitive device for boilers, to sound an alarm when the water level reaches the danger point. It consists of a simple ⅜-in. expansion tube with its inner end connected to the lower end of the water column on the boiler. Its outer end is connected to the upper part of the water column by means of a ⅛-in. copper tubing. Therefore the water rises and lowers above the expansion tube. The switch is a double-throw type and one throw is connected to an alarm. The other throw may be connected to a solenoid valve in the fuel line. A simple screw adjustment at the end of the expansion tube permits setting at any level desired. The switch will throw on and off with a temperature change of only 5°. *F. J. A. Campbell Co.*



IT'S NEW CHECK IT

30 PARAFFIN CONTROLLER for flowing and pumping wells is electric heat controlled. Equipment affects temperature as well as pressure of oil to accomplish absolute paraffin control. An electric heating element, enclosed in a watertight housing, spirals about the tubing. Housing is packed with insulation to reduce heat loss. A coke valve is interposed in the tubing immediately above the housing to relieve heated zone pressure, in order to retain the oil at flowing temperatures. The valve is equipped with a pulley and is operated by an enclosed motor. On pumping wells the equipment consists of spiral and hollow V-shaped blades attached to the sucker rod. A spiral insulating strip is received within each blade and an electric heating element is installed between the insulating strip and the cutting edge of the blade. *McClean, Smallwood & Morgan.*

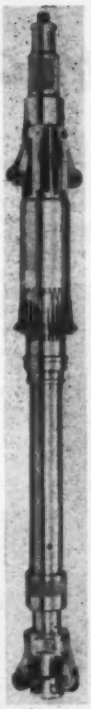


IT'S NEW CHECK IT

31 TYPE H500 ELECTRODE HOLDER has been specially designed for heavy-duty electric-arc welding. It has special long-life jaws and is all-insulated. All parts are replaceable with spares, the holder is light in weight and excellently balanced. It is suitable for currents from 100 to 500 amp. It can be used for all electrodes from No. 8 gage to ⅜-in. diameter and its jaws are specially grooved to facilitate automatic positioning of the electrodes. *Murex Welding Processes, Ltd.*

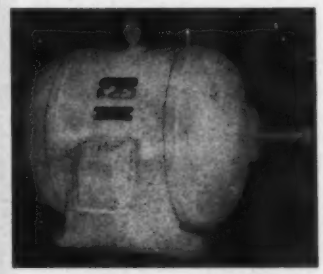
IT'S NEW CHECK IT

32 OTIS CASING CALIPER FOR CORROSION SURVEYS. Casing instrument can quickly be adapted to survey several sizes of oil and gas-well casing, from 5½-in. to 8⅝-in. New features include 30 separate contact points within the inside area of the casing, a helical drive and bevel gears which speed up the chart chamber, and stylus mechanism for a 20-pitch chart that can be reratioed for a 40-pitch chart as desired. Feeler arms operate on a two-to-one mechanical advantage. A multiplier assembly is incorporated which will give a depth-of-pit to mark-on-chart ratio of one-to-one, one-half size, according to the depths of the survey and preference of the operator. *Otis Pressure Control, Inc.*



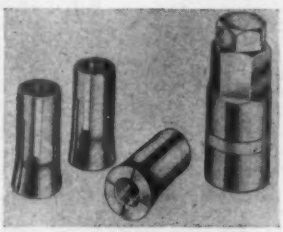
IT'S NEW CHECK IT

33 A-C MOTOR FOR APPLICATIONS REQUIRING QUICK STOPPING. The unit, fundamentally, is an induction motor with a standard squirrel-cage rotor. The stator, however, employs in addition to its running winding, a single phase a.c. winding for electro dynamic braking. In operation, the motor is started as any other standard motor, but when it is to be stopped, the circuit to the running winding is discontinued and a circuit is completed between the power source and the braking winding. Under influence of the braking winding, a retarding force several times that of full load torque is applied to the rotor. As the motor approaches a complete stop, the braking force becomes negligible, thereby permitting shifting of gears, turning by hand, or position stopping. There is no reverse torque tending to rotate the load in the reverse direction. Available in sizes from 1/20 to 10 hp. (N.E.M.A. size 286) single and polyphase. *Standard Dayton Corp.*



IT'S NEW CHECK IT

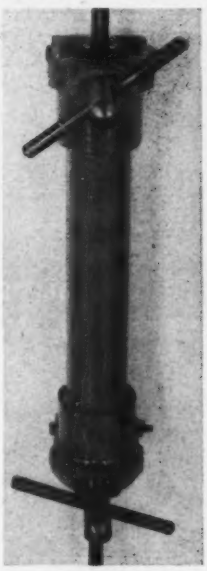
34 THREADED COLLET-TYPE STUD REMOVERS AND INSERTERS. The smaller-size unit has 14 different collets available to handle studs from ¼ to ⅝ in. in diameter in both fine and coarse-thread sizes. The larger model has six collets available for ¾ to 1-in.-diameter studs in fine and coarse-thread sizes. Collet is inserted in the housing, and the whole unit is then threaded over the stud. Turning the bolt on top draws the slotted tapered collet up into the housing, compressing it and locking it onto the stud threads with a slipproof grip. The collets are all keyed to prevent them from turning inside the housing. As the collets fit the threads the pull is directly from the threads only. *Snap-on Tools Corp.*



IT'S NEW CHECK IT

35 MEDCO FAULT FINDER has been developed for locating breaks or faults on buried pipe lines. It is particularly valuable in locating coating breaks on new construction following lowering and backfilling of the line. Unit is designed for one or two-man operation and can be used with or without headphones. Normal working range from one setup is 2 miles or more, depending upon condition of the coating. It is positive in locating breaks and eliminates unnecessary digging. Signal generator uses a 6-volt rechargeable battery, built in high-voltage power supply, and a 66.5 oscillator at 1,000 cycles. *Midwest Pipeline Service Co.*

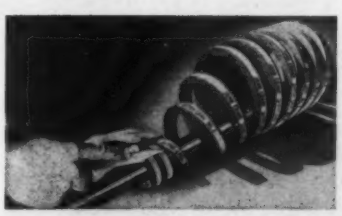
IT'S NEW CHECK IT



36 AIR POWER TONGS-SAFETY ROD WRENCH. The rod wrench is designed for use with air power tongs on rod operations. The barrel section is divided into two parts which form a full circle around the rod when assembled. The barrel section is constructed in such a way that bolts are not required to hold it in place and has the same diameter as 2 or 2½-in. tubing. T-screws both at top and bottom in the cast-steel hub assembly, permit tightening of the wrench securely around the rod without slipping. This rod wrench is built for rugged service and duty. *Baird Manufacturing Co.*

IT'S NEW CHECK IT

37 TAPE-BACK SUPER SEAL PLASTIC PACKING. A securely vulcanized tape-back is now offered as an integral part of all Super Seal spiral packings. This development increases packing flexibility and brings a plastic packing into the easy-to-handle class of ordinary braided fabric styles. Ring cutting is greatly simplified with this type of reinforcement because the spiral can be twisted down to small shaft sizes, and then cut into rings without breakage. Each Super Seal style is clearly marked in a different color for ready identification under the most adverse installation conditions. *Crane Packing Co.*



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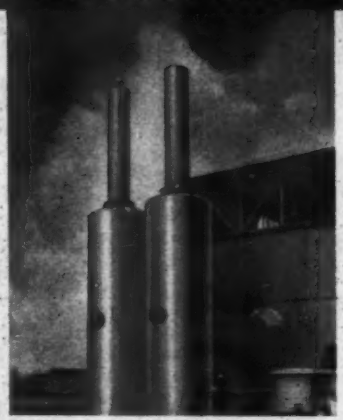
Snub the Slug—and Stop the Noise

FROM ENGINE EXHAUSTS AND COMPRESSOR INTAKES

Wherever noise from internal combustion engines, compressors, blowers, vacuum pumps, cannot be tolerated; where flying sparks must be eliminated; for surge control in gas and air piping, petroleum operators are selecting Burgess-Manning Snubbers. The Snubber prevents noise by smoothing the intake air and dissipating the energy in the exhaust gas slugs, providing quiet operation without affecting performance. Let Burgess-Manning submit Snubber recommendations. Almost 25 years' experience guarantees complete satisfaction.

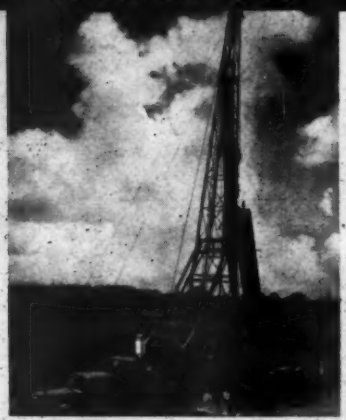
Recycling Plant

Main Line Gas Booster



Snubbers on 1600-hp Clark engines used on a main line gas booster station.

Portable Drilling Rig



Shell Oil Co. portable drilling rig equipped with a Snubber.

Pipe Line Compressing Plant

Snubbers on 800-hp compressor engines of the Panhandle Eastern Pipe Line Co.

For Quiet Telephoning—Use Burgess-Manning Acousti-Booths

You can hear easily . . . talk comfortably . . . in a Burgess-Manning Acousti-Booth, even with intense noise. Thick walls of sound-absorbent material soak up noise. Airy, easily moved, sturdy construction.

INSTALLATIONS—

- Stationary and portable internal combustion engines
- Steam discharge
- Positive displacement and reciprocating vacuum pump discharge

APPLICATIONS—gas transmission • repressuring • recycling • refineries • gasoline plants • drilling • oil well pumping • crude oil and product pipe lines.

BURGESS-MANNING COMPANY

LIBERTYVILLE, ILLINOIS

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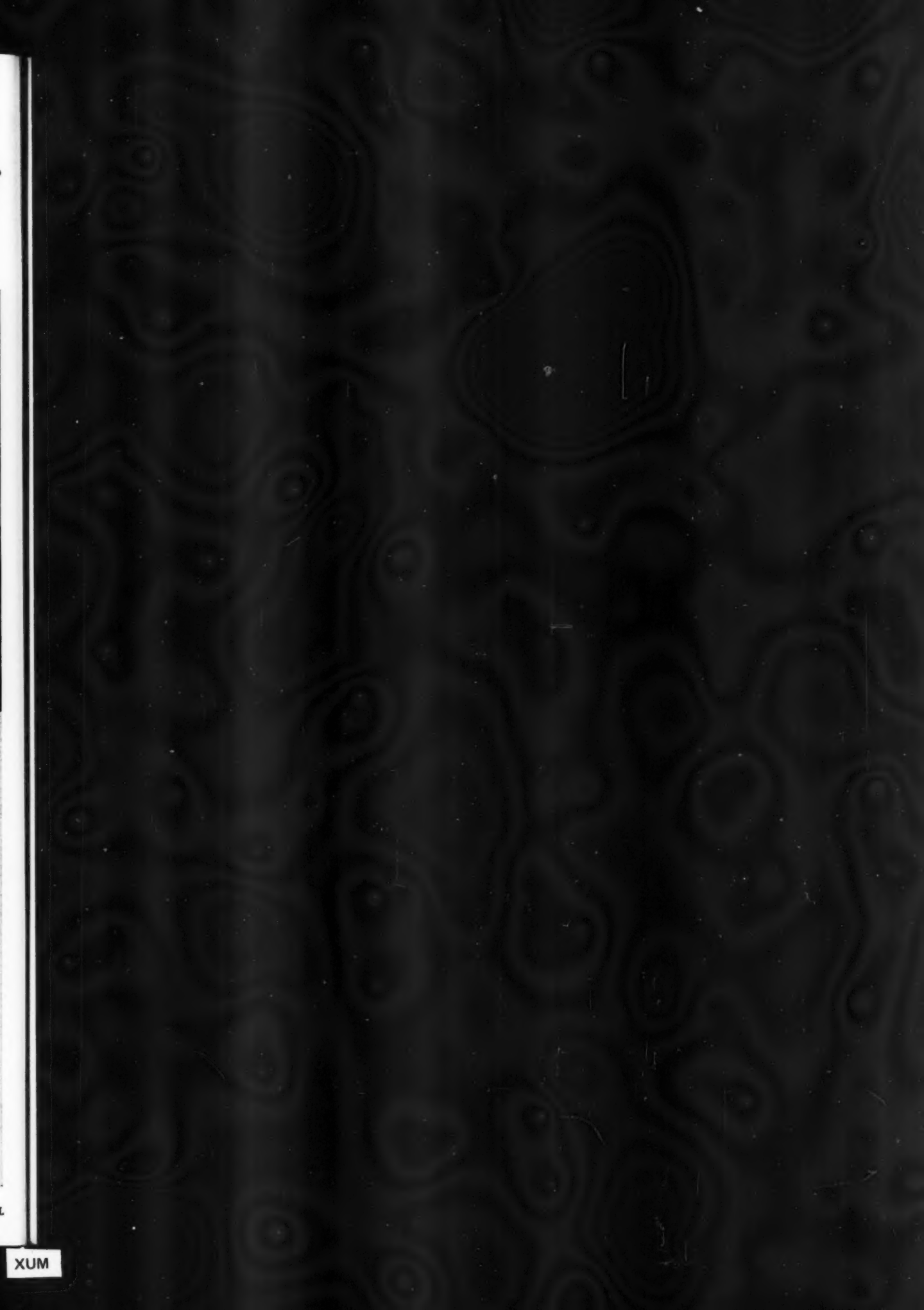

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PIPE LINES

Line Approved

Mississippi River Fuel to build 40-mile extension

WASHINGTON.—Construction of a 40-mile, 18-in. pipe line by the Mississippi River Fuel Corp., St. Louis, connecting its Perryville, La., compressor station with a point near Dubach, La., has been authorized by the Federal Power Commission in approving a part of the company's proposed expansion program. This extension will connect Mississippi's system with additional gas reserves.

Approval was also given for a line crossing the Mississippi River in the metropolitan St. Louis area, with 0.7 mile of 24-in. line and 4.6 miles of 12¾-in. line. The river-crossing facilities will connect the system with new facilities now under construction by Laclede Gas Co., St. Louis.

The facilities authorized by FPC will increase the capacity of Mississippi's system from the presently authorized 266 million cubic feet per day to 300 million cubic feet per day. Mississippi had asked authorization for 375 million cubic feet daily capacity.

Permission to continue the operation of additional compressor units totaling 4,100 hp. was also included in the opinion and order, but FPC noted that the construction and operation of these facilities without authorization are apparent violations of the Natural Gas Act.

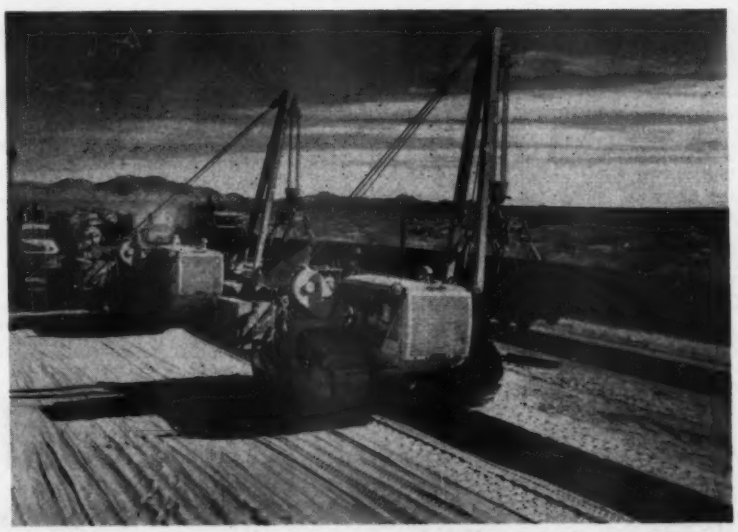
The commission rejected Mississippi's plan to lease seven compressor stations which were to be built by Stupp Brothers Bridge & Iron Co. The new stations were to have a total installed capacity of 28,380 hp., and were estimated to cost $5,392,200.

Reject leasing stations. — Mississippi proposed to lease the stations for 28 years with an option to extend the lease for another 10 years. The arrangement provided for certain fixed rentals "per $1,000,000 contract price," ranging from $63,000 per year during the first 5-year period, to $42,000 per year during the last 8-year period. The estimated aggregate rental exceeded $8,000,000 in 28 years. The contract price was described as the actual cost of facilities plus 5 per cent to cover the builder's overhead.

Total estimated cost of the expanded facilities, including the compressor plants already in operation, is $3,143,996. Mississippi owns and operates a transmission system extending from northern Louisiana through Arkansas and Missouri into Illinois, its principal sales being in the vicinity of St. Louis and in East St. Louis and Alton, Ill.

Contracting Firm Formed

Wilson & Vaughan Engineering & Construction Co. has been organized for design and building of natural-gas systems. Officers are: Ross



P.G.&E. JOB.—Boom tractors cradling 34-in. pipe for coating and wrapping operations in the Mojave desert in construction of the natural-gas line from Needles to Milpitas, Calif., by Bechtel-Price-Conyes for Pacific Gas & Electric Co.

CLEVELANDS
FOR FAST ACTION
ON THE TRENCHING JOBS
With ample power for the toughest going and a wide range of more than 30 transmission-controlled speed combinations, CLEVELANDS set a fast pace for the following operations.
TRADE MARK
THE CLEVELAND TRENCHER CO.
20100 ST. CLAIR AVENUE
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PIPE COATING and WRAPPING MACHINES
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PIPE CLEANING and PRIMING MACHINES
Stationary and Line Traveling

American Steel Works
HEATING KETTLES

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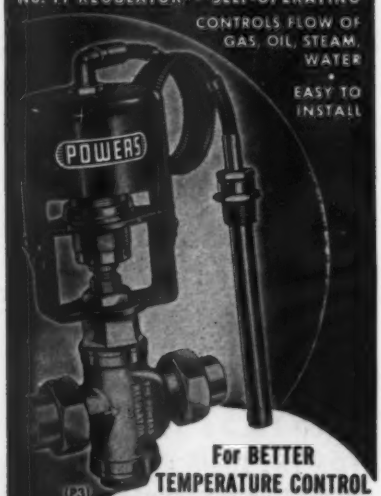
No. 11 REGULATOR • SELF-OPERATING
CONTROLS FLOW OF GAS, OIL, STEAM, WATER
• EASY TO INSTALL



For BETTER TEMPERATURE CONTROL
of Crude Oil Treaters, Heaters and Jacket Water for Compressors, Diesel and Gas Engines—use Powers regulators. They're SIMPLE • ECONOMICAL • DEPENDABLE. THE POWERS REGULATOR CO., 2707 Greenview Ave., Chicago 14, Ill. Offices in 50 cities.

WRITE FOR BULLETIN 329P

POWERS

Wilson, president; Lee Vaughan and Russell May, vice presidents; and Walter H. Helmerich, treasurer. Offices will be established at First National Bank Building, Tulsa, September 1.

The company is building three stations for Panhandle Eastern Pipe Line Co. in the Tecumseh, Mich., area. In the next 2 months work will start at Sweetwater and Ottawa, Tenn., for piping natural gas from connections with East Tennessee Gas Co.'s system now under construction.

Winnipeg Line Under Way

Construction is in progress for Winnipeg Pipe Line Co., Limited's 75-mile, 10-in. crude-oil pipe line from Gretna to Winnipeg, Man. This line will connect with Interprovincial Pipe Line Co.'s system at Gretna.

Sparling-Fowler Co., Ltd., contractors for the project, have a spread working north from Gretna.

Inspection of the Winnipeg Pipe Line Co. project is being handled by Pipe Line Engineering Co., Dallas, headed by Floyd E. Warterfield, Jr. A staff of inspectors is with the spread, under Ben Odom, chief inspector. Warterfield is undertaking pipe-line-construction inspection as a new service in addition to the engineering consultant activities of his firm.

Winnipeg Pipe Line Co., Limited, headed by Floyd C. Lantz, president, has headquarters at 100 Main Street, South, Winnipeg. It is a wholly owned subsidiary of Imperial Oil Limited. P. A. Haslett is company's field engineer supervising the Gretna-Winnipeg project.

Bechtel Work Progresses

Bechtel Corp. reported last week that work is in full progress on all three sections of Interprovincial Pipe Line Co.'s Edmonton, Alta.-Regina, Sask., crude-oil line which are contracted to Canadian Bechtel, Ltd., and Fred Mannix & Co., Ltd.

The firms have contracted for 441 miles of 20-in. E. W Davis is project manager and Ralph Hamilton is assistant manager. Bechtel-Mannix' project office is located in the Northern Hardware Building, Edmonton.

Bechtel also reported that work is in progress in the vicinity of Shafter, Calif., on Bechtel-Price-Conyes' contracted section of Pacific Gas & Electric Co.'s 506-mile, 34-in. natural-gas line from Topock, Ariz., to Milpitas, Calif. Double-ending plant is in operation at Coalinga, Calif., and a stationary-wrapping plant is located at Tehachapi, Calif. R. L. Bowman is general superintendent, with M. V. Scott serving as manager. Main-line office is at Shafter, Calif. Steve Valline is administrative manager, located at San Francisco.

Work will begin this month at

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Above: Midwinter in Pennsylvania—Barrett A. A. Enamel will not crack at -20° F.
At right: Midsummer in the Arizona desert—Barrett A. A. Enamel will not flow, even at 160° F.

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WRITE FOR BULLETIN BM1001

M. J.
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M & M Building Houston, Tex.

Newport, Ark., by Bechtel Corp., H. C. Price Co., and Midwestern Constructors, Inc., on 409 miles of 30-in. gas line for Texas Illinois Natural Gas Pipeline Co., which will run from Corpus Christi to Joliet, Ill. E. W. Davis is project manager; A. M. Berlander is general superintendent; S. D. Bechtel, Jr., is superintendent; and E. C. Elting is office manager. Spread office is at the airport at Newport, Ark.

20-Mile Line Approved

WASHINGTON.—Federal Power Commission has issued a certificate of public convenience and necessity authorizing Prince Georges Gas Corp. to construct and operate approximately 20 miles of 22-in. natural-gas pipe line between a point of connection with the pipe-line facilities of Atlantic Seaboard Corp. and applicant's storage and compressor station.

The new pipe line will be used, Prince Georges Corp. states, to transport increased volumes of natural gas from Atlantic Seaboard's facilities for delivery to its parent, Washington Gas Light Co., and another subsidiary, Washington Gas Light Co. of Maryland.

The facilities authorized, it is estimated, will have an ultimate delivery capacity of 122,000,000 cu. ft. per day, which is required to meet increased demands for gas service in the District of Columbia and adjoining areas of Maryland and Virginia.

The estimated over-all capital cost of the proposed facilities is $1,360,000.

Ohio Hearing Under Way

WASHINGTON.—A hearing began here August 15 before Federal Power Commission on the application of Ohio Fuel Gas Co. for a certificate of public convenience and necessity authorizing construction and operation of certain natural-gas transmission facilities.

Ohio Fuel Gas Co. proposes to construct a natural-gas line from a point of connection with the pipe-line facilities of Texas Eastern Transmission Corp. to applicant's existing line in Ohio.

Ohio Fuel has requested that its application be heard under the shortened procedure provided by the commission's rules of practice and procedure. No request to be heard or protest has been filed since the publication of the application.

Transcontinental Upheld

MEDIA, Pa.—Right of Transcontinental Gas Pipeline Corp. to condemn property in Pennsylvania for extension of its natural-gas lines to the Philadelphia and New York City areas was upheld last week by Judge Harold L. Ervin of Delaware County Court.

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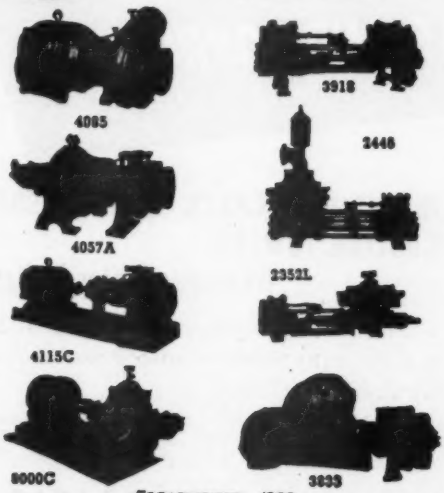

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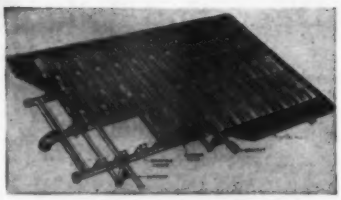

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NATURAL GAS

Georgia Line Sought

WASHINGTON.—In a new application filed with the Federal Power Commission, Georgia Natural Gas Co., Albany, Ga., proposes to construct a pipe line to serve natural-gas markets in southwestern Georgia and Tallahassee, Fla. An earlier application was withdrawn.

The proposed transmission system would connect with the Phenix City, Ala., facilities of Southern Natural Gas Co., Birmingham. Estimated overall cost of the project is $5,100,000, which would be financed by the issuance of first-mortgage pipe-line bonds and the sale of common stock.

Georgia Natural estimates its annual demand at 9,167,098,000 cu. ft. of gas, with an estimated maximum day, firm, of 30,000,000 cu. ft. The application asks that FPC direct Southern Natural to provide and sell Georgia Natural an adequate supply of gas for the proposed project.

Gas-Plant Contract Let

PITTSBURGH.—Contract for a natural-gas dehydration plant to be installed near the Pennsylvania-New York state line has been awarded by New York State Natural Gas Corp., Pittsburgh, to the Chemical Plants Division of Blaw-Knox Co.

To process gas coming from underground storage, the plant will have an initial capacity of 200,000,000 cu. ft. daily, and will later be expanded to 300,000,000 cu. ft. The plant will cost approximately $250,000, with completion set for December.

A solid type desiccant will be employed, and the plant will be designed for operation at a pressure of 1,000 psi. By suitable automatic controls, the dew point of the gas will be regulated at an exact value. Hydrate formation will be eliminated by removing water, insuring a dry transmission line and minimizing service interruptions.

Revenues, Taxes Climb

WASHINGTON. — May operating revenues of natural-gas companies were up 29.4 per cent over the same month a year ago, according to reports compiled by the Federal Power Commission. Total for May was $92,726,667 compared with $71,675,218 in May 1949.

Gas-utility operating income for May 1950 amounted to $17,312,381, up 62.4 per cent from the $10,658,579 reported for May 1949.

An increase of 23.7 per cent in gas-operating revenue deductions brought the total to $75,480,869. Operating expenses accounted for $55,842,072, up 20.6 per cent; depreciation for $7,918,243, up 12.3 per cent; and taxes for $11,720,554, an increase of 52.4 per cent.

Texas Gas' Hearing Set

WASHINGTON.—The Federal Power Commission has set a public hearing to begin here September 1 on application of Texas Gas Transmission Corp. for a certificate of public convenience and necessity authorizing it to install and operate 5,460 additional horsepower in existing natural-gas compressor stations, and to construct a new 4,500-hp. compressor station.

The firm also would transport for Texas Eastern Transmission Corp., up to 60 million cubic feet of natural gas per day until November 1, 1951, or until Texas Eastern shall have completed certain new facilities for which it has asked authorization, whichever is earlier and up to 34.4 million cubic feet of gas per day for a period beginning with November 1, 1951, and ending 2 years from the date of first delivery of the 60 million cubic feet, or until Texas Eastern has completed facilities for which it has applied to the commission for authority to construct, whichever is earlier. Total cost is estimated at $2,108,887.

Rate Changes Suspended

WASHINGTON.—The proposed rate change of Panhandle Eastern Pipe Line Co. in its rate schedules covering the sale and delivery of natural gas to Michigan Consolidated Gas Co., Texas Gas Transmission Corp., and East Ohio Gas Co., have been suspended by the Federal Power Commission.

Panhandle proposed to cancel its present rate schedule for interruptible service to the three customer companies. Michigan Consolidated and the City of Detroit protested the cancellations and requested the suspension. No hearing date was set by FPC.

Sale Is Proposed

WASHINGTON. — To give more efficient and economical service to customers, Natural Gas Co. of West Virginia proposes to sell its West Virginia and Pennsylvania properties to Manufacturers Light & Heat Co., in a joint application filed with the Federal Power Commission.

The firm's transmission system, located in Washington and Greene counties, Pennsylvania, and Ohio and Marshall counties, West Virginia, consists of three 8-in. pipe lines and one 10-in. line extending generally from production and storage fields in Pennsylvania to the Wheeling, W. Va., area, certain minor transmission lines, and two small compressor stations.

The total purchase price of the facilities is $3,231,833.74. In addition to the property offered, Natural of West Virginia also has production, transmission, and distribution facilities in northeastern Ohio. Sale of the properties would further integrate the present facilities of both companies in the area.

Natural Gasoline

Pump Station Enlarged

Magnolia Petroleum Co. is enlarging the capacity of its Pettus gasoline-pumping station in Bee County, Texas, and when work is completed, the installation will increase capacity flow from 9,600 bbl. daily to 19,200 bbl. daily.

To handle the increased supply, a 5-mile, 4-in. pipe line is being laid from the plant to the Pettus junction of the company's Corpus Christi-San Antonio pipe line.

Installation of the new pump is near the Burnell and North Pettus cycling plant operated by Stanolind Oil & Gas Co. Paralleling a line laid last year, the new pipe line will allow pumping of refined gasoline north to San Antonio and south to Corpus Christi at the same time. Valve controls are being installed at the Pettus junction to handle the two-way flow.

Cost of the dual project is estimated at $50,000, half for the new pumping unit and half for the pipe line. McGilvray Lease Service of Beeville has contract for the pump installation and Stuart Pipe Line Construction Co., also of Beeville, is laying the gasoline line.

Superior Plant Site

EAGLE LAKE, Tex.—Ground has been broken near Ramsey, 7 miles east of here, for Superior Oil Co.'s natural-gasoline plant, which will be capable of handling 50,000,000 to 70,000,000 cu. ft. of gas daily.

In its announcement last March, the company said the plant would cost approximately $1,500,000. At that time Altair, Tex., was given as the intended site.

Superior has taken a 50-year lease on the 25-acre site, owned by Adolph Feik of Eagle Lake. B. H. Toliver, Jr., engineer of Eagle Lake, is supervising the work of laying out the site, grading, and making the streets.

Plant construction is expected to start in the fall, with completion date about a year later.

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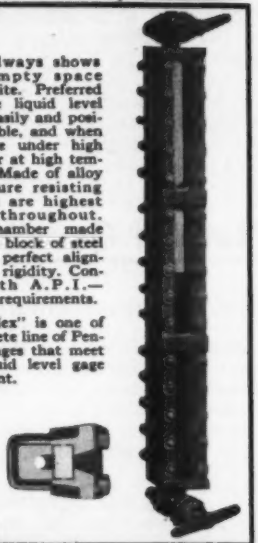

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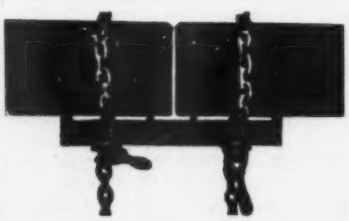

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REFINING

New York Plan Amended

NEW YORK.—The New York City Bureau of Smoke Control, in response to a storm of protest from the petroleum industry and others, announced last week that it has decided to omit any limitation of the sulfur content of fuels from its rules at present.

William G. Christy, bureau director, said that the agency will make further studies of sulfur content and decide later whether any limitation should be included in its rules. A limitation of a maximum of 2 per cent sulfur content in all fuels in the bureau's original proposal of rules brought warnings of severe consequences from oil-industry spokesmen and the Citizens Union *(The Oil and Gas Journal, August 10, 1950, page 117).*

Carbon-Black Plant Started

BAYTOWN, Tex.—Work has started by Stearns-Rogers Construction Co. in clearing the site for J. M. Huber Corp.'s new $1,500,000 carbon-black plant, which will be constructed here.

The plant is part of a $6,000,000 expansion program planned by the Huber firm in 1950. It will be a furnace-type plant, using crude-oil as its basic material for carbon-black production.

Richardson Plant to Reopen

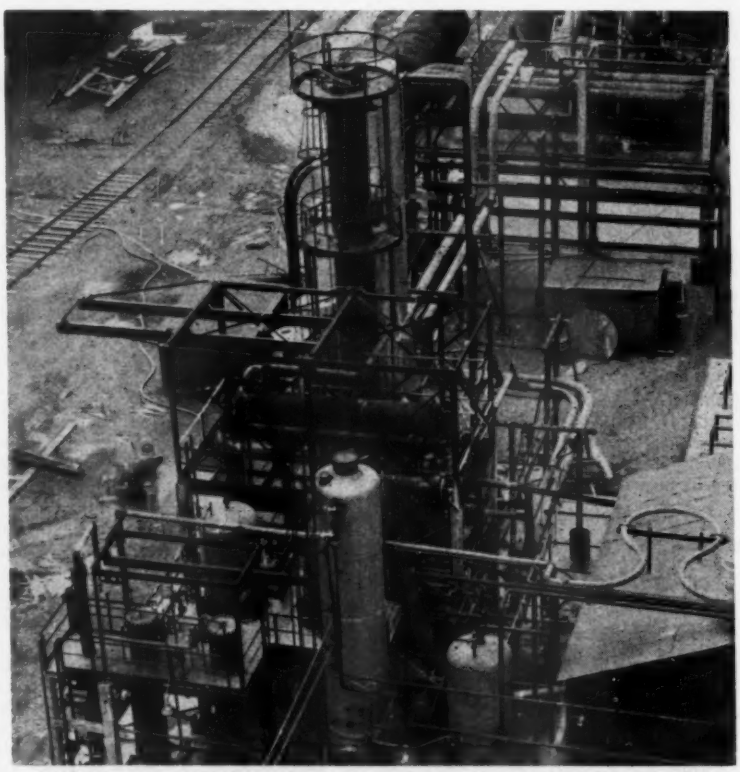
TEXAS CITY, Tex.—Sid Richardson Refining Co.'s plant here, shut down for the past 14 months, will reopen soon, the company said last week.

John Allen, superintendent of the plant, said the facilities would be reopened on a permanent basis as part of the war effort. The firm will call back all former employes, and at least 175 men will be used at the plant.

What the company will produce at the plant was not disclosed.

Ammonia Plant to Operate

HOUSTON.—The San Jacinto Ammonia Works at the San Jacinto Ord-



L.P.G. UNIT.—Above is Sinclair Refining Co.'s newly completed unit for production of liquefied petroleum gas at the firm's Marcus Hook, Pa., refinery. Designed and constructed by Sinclair personnel, the unit has a capacity of 1,100 bbl. daily. (A detailed engineering article appeared in The Oil and Gas Journal, August 3, 1950, page 66.)

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nance Depot near here will resume production of anhydrous ammonia this month. The plant, formerly operated for the Government by Hercules Powder Co., will gradually attain full-capacity production.

Fire Damages Refinery

WYNNEWOOD, Okla.—An explosion and fire did an estimated $50,000 damage at Kerr-McGee Oil Industries, Inc.'s, refinery here last week.

James J. Kelly, production manager of the plant, which produces gasoline, asphalt, and other petroleum products, said the fire was caused by escaping vapors from an asphalt tank. Five tanks exploded as the result.

The refinery processes 7,500 bbl. of crude daily.

A.C.S. Program Readied

CHICAGO.—The program for the 118th national meeting of the American Chemical Society is being readied for members who will convene at the Stevens Hotel here September 3-8. Many outstanding symposia will be featured which will touch on all phases of the chemical, petroleum, and agricultural industries.

Among symposia of interest to petroleum refiners will be those on use of isotopes in petrochemistry, and agricultural applications of petroleum products.

The symposium on isotopes will be led by G. A. Mills, and will be held on September 4 jointly with the Division of Physical and Inorganic Chemistry. Among papers to be presented are:

"Preparation of Propane 1-C^{13}. Electroreduction of Acetone to Propane," by A. S. Gordon and S. Heimel; "Rearrangement Peaks in the Mass Spectrum of Terminally C^{13}-Labeled Neopentane," by A. Langer and P. Johnson; "Mass Spectrometric Study of Deuterium Exchange in Hydrocarbons," by R. E. Honig; "Recovery of Inorganic Ash from Petroleum Oils. Radioactive Tracer Method," by L. O. Morgan and S. E. Turner.

J. Turkevich will preside over the second session of this symposium, which will include the following papers: "Hydrogen Exchange Between Cracking Catalyst and the Butanes," by S. G. Hindin, G. A. Mills, and A. G. Oblad; "Hydrocarbon Synthesis Catalyst Studies. Use of Deuteriochloric Acid," by H. I. Weck, S. Myerson, and H. S. Seelig; and "Mechanism Studies of the Fischer-Tropsch Synthesis. The Addition of Radioactive Alcohol," by J. T. Kummer, W. B. Spencer, H. H. Podgurski, and P. H. Emmett.

The symposium on agricultural applications of petroleum products will be held on Monday, September 4, jointly with the Division of Agricultural and Food Chemistry. R. B. Killingsworth will preside. Included will be papers on the following:

"Insecticidal Properties of Hydrocarbon Compositions," Part 1 of which deals with efficiency of petroleum fractions and synthetic isoparaffins, by G. W. Pearce and P. J. Chapman; Part 2, which deals with evaluations of petroleum fractions against California Red Scale and Citrus Red Mite, by L. A. Riehl and J. P. Ladue.

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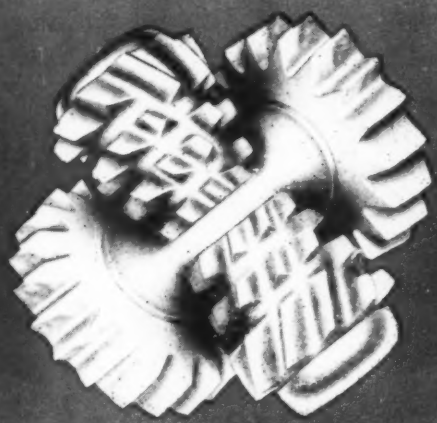

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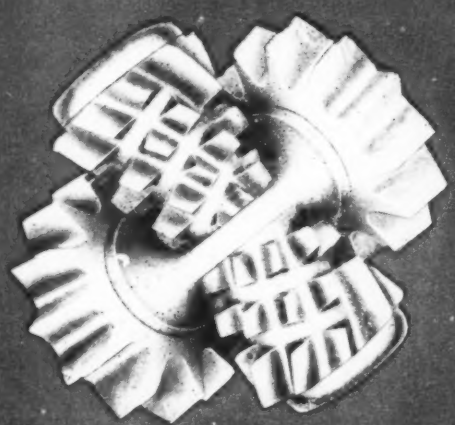

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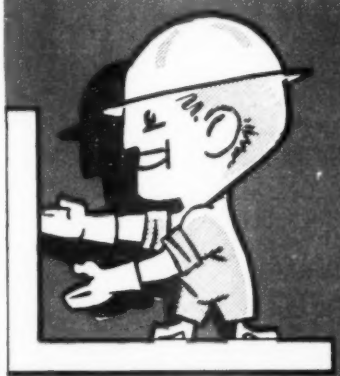

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Among the Drilling Contractors

Rocky Mountain Drills Castaic Area Discovery

Rocky Mountain Drilling Co., Los Angeles, apparently has drilled another discovery well. It is The Texas Co. 1 Honor Farm, a wildcat in the Castaic area, eastern Santa Clara Valley, on a drill-stem test at 5,313-33 ft., flowed at the estimated rate of 500 bbl. of oil daily.

Other rigs of this contractor at work include one for Standard Oil Co. in the West Montalvo area, one for General American Petroleum Corp. in the Newhall-Potrero field, and two for Shell Oil Co., one each in the Ventura Avenue and Dominguez fields.

ROTARY RIGS IN OPERATION*
(United States and Western Canada)

Area—	Week ended 8-7-50	Change week ended 7-31-50	Change week ended 8-8-49
Gulf Coast	498	—18	— 21
W. Tex.-N. M.	746	+ 4	+220
Ark.-N. La.-E. Tex.	157	+ 1	— 4
Oklahoma	250	+ 7	+ 12
Kansas	121	— 9	+ 12
Illinois-Eastern	153	+12	+ 21
Rocky Mountains	112	+ 8	— 5
Pacific Coast	148	+ 4	— 4
Total United States	2,185	+ 9	+231
Western Canada	95	—11	+ 20
Total	2,280	— 2	+251

*Courtesy Hughes Tool Co. Trends in drilling activity in the United States and in the West Texas-New Mexico and Oklahoma-Kansas districts are shown by graphs on pages 182 and 183.

Olson Tools Drilling Two New Deep Tests

Olson Drilling Co., Tulsa, has taken on a 6,500-ft. contract for a Wilcox sand test to be drilled for V. A. Brill at a wildcat location about 2½ miles south of the Southwest Denver pool, Cleveland County, Oklahoma. Locations is in SE SE NE 16-8n-1e, on the Riordan land. This company also is starting a 7,000-ft. wildcat about 3½ miles southeast of Jet, southeastern Alfalfa County, northwestern Oklahoma. It is 1 Morris, NW NW SW 27-25n-9w, and will be drilled as a joint operation with George W. Deck.

Coats & Hearrell Drilling Co., Gladewater, Tex., has a rig on a wildcat location in the R. Brown Survey, 8

Denton Dailey (standing at extreme right), toolpusher for Richardson & Stewart Drilling Co., San Antonio, with crew members on one of his rigs operating in the LaGloria field, Jim Wells and Brooks counties, South Texas, and "Tommy" Thompson (standing at his right), representative of Hughes Tool Co. Crew members are: J. A. Atkins and J. M. Coleman (standing, left to right), floormen; and Frank Denning and G. M. Mullins (front, left to right), derrickman and fireman, respectively.

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miles northeast of Hawkins, Wood County, East Texas, where it will drill a contracted 6,000-ft. test, 1 Don Roberts, for Mack Hays and Eugene Talbert.

H. G. Lunsford, Shreveport, is the contractor on a 3,000-ft. wildcat test which Lyons, Prentiss & McCord are starting in the NE NE SW 14-13s-23w, 8 miles northwest of the Bodeau townsite, Nevada County, Arkansas.

Rainbow Drilling Co., El Dorado, Ark., is starting a 3,600-ft. test at a wildcat location 6 miles east of El Dorado, Union County, Arkansas. The test, 1 Jerry, in 28-17s-14w, is for Martin & Pritchard.

Brewster-Bartle Drilling Co., Houston, has the contract for a 9,500-ft. wildcat test which Progress Petroleum, Inc., has projected in 86-6s-9e, 2½ miles west of the Maringouin townsite, Pointe Coupee Parish, Coastal Louisiana.

E. K. Carey Drilling Co., Inc., Denver, got the contract for a wildcat test which Carter Oil Co. has projected for the area near Harrisburg, in Washington County, Colorado. The location, on the Sheetz lease, is in the SE SE SW 11-3s-51w.

Yellowstone Drilling Co., Casper, has a rig on a wildcat location south of Mush Creek, Weston County, Wyoming, where it is drilling a Newcastle sand test for Woodward Oil Co. and others. Location for the test, 1 Rumpeltes, is in the C SE NE 19-43n-62w.

Hilton Drilling Co. is the contractor on a Dakota sand wildcat test being started by Oil Hunters, Inc., near Hyannis, Grant County, Nebraska. Location is in the NE NE NW 9-21n-38w.

Earl Seiler has contracted with Eddie Fisher of Los Angeles for the drilling of a wildcat test in 8-12n-58w, Kimball County, Nebraska. Rig is being moved in.

Murfin Drilling Co., Wichita, is using cable tools in drilling a 5,000-ft. test for Intex Oil Co. near Texanna, McIntosh County, Oklahoma. The test, 1 McKee, is in 18-10n-18e.

Delta Drilling Co., Tyler, Tex., has a rig on a wildcat location in Section 50, Block E-2, D&SE Survey, 8 miles southeast of Silverton, Briscoe County, Texas, where it is drilling for W. J. Weaver. The test is known as 1 Adair Estate.

Newton Barrett Drilling Co., Shawnee, Okla., is drilling Carter Oil Co. 3 ITIO-C-1, a recently started test in the North Seminole area, Seminole County, Oklahoma. Location is in the SW SW NW 11-9n-6w. This company also has a rig working for An-Son Petroleum Co. on a wildcat test, 1 Stewart, in the Shawnee area, Pottawatomie County. Location of the latter is in the NE SE SE 9-10n-4e.

Decem Drilling Co., Oklahoma City, is starting the second well for Arthur B. Ramsey on the latter's Martin lease at the northwest end of the Camp pool where production recently was extended westward from Carter into Stephens County, Oklahoma. Contract calls for 5,000 ft. Location is in the NE NE SE 1-2s-4w.

D. L. Rose is the contractor on a 6,500-ft. wildcat test which Southern Production Co. and American Republics Corp. are starting in the Carl Ziehen Survey 896, 1½ miles northwest of Christoval, Tom Green County, Texas. The test is 1 Easterwood.

Glenn Gillespie & Sons, Cushing, Okla., are starting a test for Mid-Continent Petroleum Corp. at a wildcat location south of southern tip of the Cushing field in western Creek County. The test is 1 Mahan. The location is in the NE SW NE 22-16n-7e.

Mohawk Drilling Co., Oklahoma City, has a contract from National Associated Petroleum Co. of Tulsa for drilling a 7,700-ft. wildcat test (1 Stephens), located in the C NE NE 15-16n-6w, 6 miles east of Kingfisher, Kingfisher County, Oklahoma.

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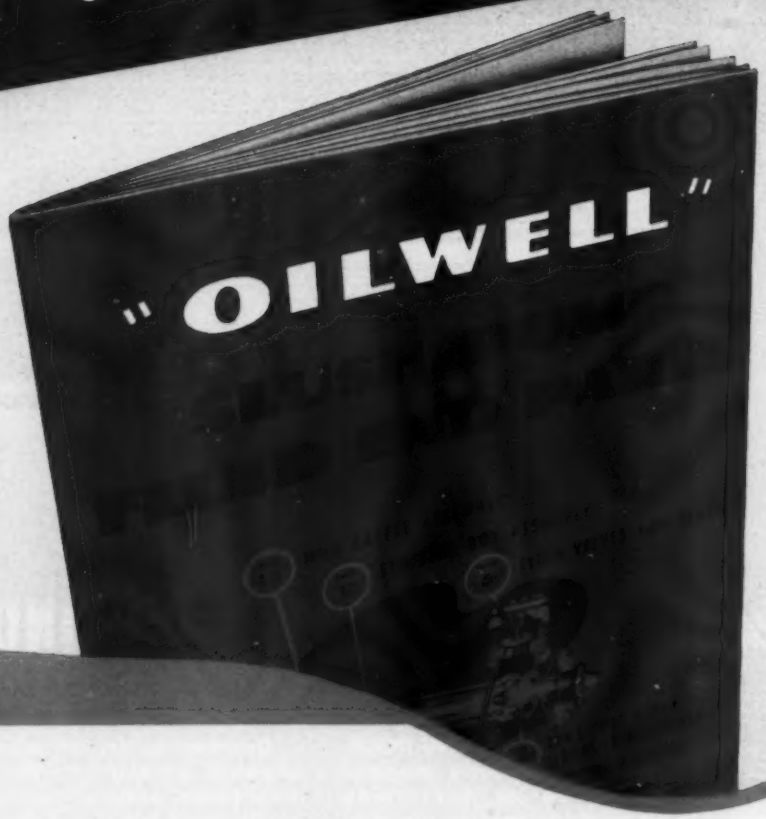

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Tristate's Production Dominated by Few

THE tristate area of Illinois, Indiana, and Kentucky has been the happy hunting grounds for both majors and independent operators for many years. It has been and continues to be especially attractive to independent operators.

Producing depths in this area are comparatively shallow (average depth is in the neighborhood of 2,200 ft.), initials are frequently high so that quick payouts are common, and, because of the quality of the crude and the nearness of production to the principal marketing areas, crude brings a higher price at the well head than comparable crude does in the Mid-Continent area.

Illinois dominates the area with between two and a half and three times the production of the other two states together. Also it is in Illinois that the biggest pools in the area have been found. Salem has an accumulated production of about 215,000,000 bbl. and is now producing about 10,600 bbl. daily. The Texas Co.'s daily average production at Salem is over 7,400 bbl. or about 70 per cent of the pool total. Loudon's accumulated production is 152,000,000 bbl. Out of a total daily average production of around 21,100 bbl. Carter Oil Co. produces 12,300 bbl. or 58 per cent. Clay City-Noble, which is an area consolidating 30 or more pools that have run together, has an accumulated production of 130,000,000 bbl. In this extensive area Pure Oil Co. produces 12,800 bbl. of the current daily average of 20,750 bbl., over 60 per cent.

Other pools in Illinois that are estimated to be of major size, that is, with ultimate production in excess of 20,000,000 bbl., are Sailor Springs, Benton, Dale-Hoodville, Rural Hill, Centralia, Johnsonville, New Harmony-Keensburg and the old producing area of Clark, Crawford, and Lawrence counties.

In Indiana, not including the old producing area in the east-central part of the state, there is only one major pool. That is Griffin, which has produced over 25,000,000 bbl. of oil since its discovery in 1939. Continental Oil Co. has nearly half of the pool's present daily average production of 2,850 bbl. Plainville field, discovered in the latter part of December 1949, is now the second largest producer in the state with National Associated Petroleum Corp. producing nearly 1,000 bbl. out of the total field's daily average production of 2,400 bbl.

Kentucky has no major fields in the tristate area, which does not include the old producing area of the eastern part of the state nor the fields in the south-central part. The largest pool in Kentucky is Uniontown with 11,500,000 bbl. produced to date. This pool is currently producing 2,000 bbl. daily of which Sun Oil Co. has 800 bbl. Sun also has over 2,500 bbl. of South Morganfield's daily average production of 4,150 bbl., highest in the state. Hitesville is producing 1,350 bbl. daily of which Carter produces 850.

Philip C. Ingalls.

LEADING PRODUCERS IN TRISTATE AREA

ILLINOIS

Producing company—	Bbl. per day
Texas	16,500
Carter	16,300
Pure	15,500
Ohio	8,600
Magnolia	5,100
Sohio	4,500
Superior	4,300
Shell	4,100
Gulf	4,000
Ashland	2,800
Continental	2,700
C. E. Skiles	2,300
Nat'l. Associated	2,100
Kingwood	1,800
Phillips	1,800
Others	77,700
Total state	170,100

INDIANA

Producing company—	Bbl. per day
Carter	3,400
Superior	1,700
Continental	1,400
Ashland	1,100
Nat'l. Associated	1,000
Ind. Farm Bureau	930
O. D. Sharp	920
C. E. Skiles	800
F. B. Cline	630
A. S. Reed	520
C. E. McBride	500
Ohio	500
George & Wrather	430
B.L.S.	350
Ill. Mid-Cont.	320
Others	16,850
Total state	31,400

KENTUCKY

Producing company—	Bbl. per day
Sun	4,400
Carter	2,300
Ashland	1,600
Kingwood	1,000
Sinclair	1,000
Gulf	900
Miller & Shiarella	800
G. Lakes Carbon	450
Petroleum S.W.	420
I. B. Browning	400
Pursuit	370
Delta Drilling	360
Sohio	360
Texas	360
Cherry & Kidd	340
Others	13,740
Total state	28,800

HIGHLIGHTS OF WEEK'S DEVELOPMENTS

WEST TEXAS.—Sinclair and Magnolia 1 Davis, northwest Upton County wildcat, recovered 300 ft. of gas-cut mud with no oil or water, and 3,400 ft. of gas in the drill pipe, on a 4-hour test from 13,169-13,313 ft., 208 ft. into the Ellenburger. Union Oil Co. 1 Cotton, Terry County wildcat 4 miles southeast of Brownfield, topped a Pennsylvanian reef at 9,902 ft., minus 6,640 ft., and was drill-stem testing. Production at Mound Lake, 11 miles northeast, is from Pennsylvanian lime at 9,900-33 ft. Plymouth Oil Co. 1 Thomerson, Schleicher County test 12 miles south of Susan Peak field, recovered heavily oil-cut mud on a drill-stem test at 3,220-64 ft. in the Cisco lime of the Pennsylvanian.

ROCKY MOUNTAIN AREA.—In the Fort Morgan and Merino areas, Colorado, confirming oil tests indicate sizable pools in new discovery areas. Amerada Petroleum Corp. found gas in the Mesaverde at its wildcat in the Deep Creek area, Wyoming. Stanolind Oil & Gas Co. and Carter Oil Co. have run casing on their second well at Roosevelt, Utah, with indication that the ½-mile extension will be a good producer.

SOUTH LOUISIANA.—In Iberia Parish, Shell Oil Co. has set a new producing depth record for the state. The well, 2 Weeks Gall State Unit, produces from 15,137 ft., only 393 ft. shy of the world record. *(See page 54, this issue.)*

XUM

Kansas

Another Producing Spot Opened in Morlan Area

HEATHMAN DRILLING CO. is opening another new pool in the Morlan pool area of southeastern Graham and southwestern Rooks counties. Located about 2 miles southeast of the main Morlan pool in the NW NW NW 30-10-20, on the Rooks County side of the line, that company's 1 Raymond is being put on the pump following swabbing tests, in which it produced an average of about 4 bbl. per hour after acidizing. Production is from Arbuckle lime, topped at 3,705 ft. (—1,583 ft.). Bottom of the hole is 3,708 ft., with casing at 3,706 ft. Only 350 gal. of acid was used.

Petroleum, Inc., 1 Hall, SE SE SW 7-21-13, a wildcat in the gap between the Dell pool, about a mile to the north, and the North Pundsack pool, about the same distance to the south, has run casing to test good oil showings encountered in the Arbuckle lime, topped at 3,635 ft (—1,718 ft.). In a 60-minute drill-stem test of the zone at 3,636-40 ft., 280 ft. of oil and 20 ft. of mudy oil was recovered. Indicated bottom-hole pressure was 1,100 psi. Small showings also were found in the Lansing-Kansas City section, with top of the Lansing at 3,335 ft.

Opening of another new pool for northwestern Barton County seems assured following swabbing tests in Lindas Oil Co. 1 Schmidt, NW NW NW 7-17-14. In a 9-hour test, the well swabbed an average of 7 bbl. of oil per hour. Production is from Arbuckle lime, topped at 3,464 ft. (—1,493 ft.), and drilled to a total depth of 3,469 ft. This discovery is about 2 miles north of the Axman pool and about the same distance northwest of the Capitol View pool.

About 2½ miles to the northeast of the Lindas well, in the same county, Musgrove Petroleum Co. and Westgate-Greenland Oil Co. found promising oil and gas showings in the Lansing-Kansas City section in their 1 Popp, SE SE SW 29-16-14, but are drilling ahead to the Arbuckle. Top of the Lansing was 3,216 ft. (—1,218 ft.). A drill-stem test at 3,222-52 ft. yielded 340 ft. of oil and gas-cut mud, 300 ft. of gas and slightly water-cut oil, 370 ft. of oil-cut water, and 60 ft. of water.

The Texas Co. is preparing to test oil showings found in the Reagan sand in its 1 Criswell, SW SW SW 14-5-21, in Norton County, at the northern edge of the state. A 60-minute drill-stem test at 3,594-3,610 ft. in this sand, topped at 3,600 ft. (—1,427 ft.) yielded 45 ft. of oil-cut mud. Bottom-hole pressure was 520 psi. Casing (5-in.) has been run to the top of the sand. The location is about 1½ miles north of the West Ray pool.

The Texas Co. has a possible Lansing-Kansas City lime discovery well in its 1 Fries, SE SE NW 10-12-20, a wildcat located 6 miles from nearest production (Ellis pool), in Ellis County. The well was drilled to the Arbuckle, but only slight showings were found in this zone. Casing has been run to test the Lansing-Kansas City zone, top of which was logged at 3,528 ft. (—1,326 ft.). A 60-minute drill-stem test was made of an interval at 3,703-11 ft. This yielded 85 ft. of gassy oil and 35 ft. of oil and gas-cut mud. Indicated bottom-hole pressure was 1,050 psi. Arbuckle was logged at 3,906-19 ft.

KANSAS SUCCESSFUL WILDCATS

Barton County, extension to Ainsworth, South: Darby-Bothwell 1 Underwood "A," NE SE NE 15-17s-13w, elev. 1,847 ft. DF and 1,845 Gr., pumped 41 bbl. of oil per day from Arbuckle at 3,342-48 ft., TD; anhydrite 780 ft., Heebner 3,008 ft., lime 3,091 ft., Lansing-Kansas City 3,105 ft., no Sooy.

Meade County: Skelly 1 McKinney, NW NW NE 2-34s-26w, elev. 2,287 ft., gaged 14,870,744 cu. ft. of gas per day from Mississippian at 5,762-92 ft., 5,811-17 ft., and 5,822-27 ft., TD 7,686 ft.

Stafford County: Vickers 1 Frey, SW SW NE 7-21s-14w, elev. 1,931 ft., 2,392 bbl. of oil per day from Arbuckle at 3,717-22 ft., TD; lime 3,361 ft., Lansing-Kansas City 3,378 ft., Sooy 3,626 ft., Viola 3,631 ft., Simpson 3,663 ft.

KANSAS WILDCAT FAILURES

Butler County: Myer 1 Letring, SE NE NW 12-29s-4e, elev. 1,266 ft., dry, TD 2,950 ft., Lansing 1,915 ft., Kansas City 2,265 ft., Mississippi lime 2,878 ft.

Ottawa County: Haney et al., 1 Faidley, SW SW NE 27-10s-1w, elev. 1,395 ft. DF and 1,394 Gr., dry, TD 3,695 ft., Lansing-Kansas City 2,040 ft., Mississippi lime 2,649 ft., Kinderhook 3,837 ft., Hunton 2,987 ft., Maquoketa 3,273 ft., Viola 3,425 ft., Simpson 3,520 ft., Arbuckle 3,642 ft.

Phillips County: Francis Oil & Gas 1 Parker, NE NE NW 10-5s-18w, elev. 1,979 ft. DF and 1,977 Gr., dry, TD 3,588 ft., anhydrite 1,435 ft., Topeka 2,901 ft., Lansing-Kansas City 3,154 ft., Sooy 3,490 ft., Arbuckle 3,561 ft.

Rooks County: Cities Service 1 Benedick, NE NE SE 27-9s-17w, elev. 2,098 ft., DF and 2,096 Gr., dry, TD 3,650 ft., Topeka 3,011 ft., Heebner 3,186 ft., Toronto 3,205 ft., Lansing-Kansas City 3,231 ft., sand Sooy 3,516 ft., cherty Sooy 3,557 ft., Arbuckle 3,637 ft.

Thacker 1 fee, NW NW NE 21-10s-17w, elev. 2,077 ft. DF and 2,072 ft. Gr., dry, TD 3,715 ft., anhydrite 1,340 ft., Topeka ft., Lansing-Kansas City 3,296 ft., Sooy 3,059 ft., Heebner 3,260 ft., Toronto 3,287 3,585 ft., Simpson 3,673 ft., Arbuckle 3,694 ft.

Sedgwick County: Carlock 1 Wilson, NE NE NW 24-25s-1w, elev. 1,367 ft. DF and 1,365 ft. Gr., dry, TD 3,171 ft., Lansing 2,343 ft., Kansas City 3,638 ft., Mississippi lime 3,158 ft.

Stafford County: Armer 1 Curtis, NW NW SE 24-24s-14w, elev. 1,943 ft. DF and 1,941 ft., Gr., dry, TD 4,246 ft., anhydrite

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835 ft., Heebner 3,463 ft., lime 3,597 ft., Kansas City 3,627 ft., Mississippi lime 3,992 ft., Kinderhook 4,014 ft., Viola 4,046 ft., Simpson 4,155 ft., Simpson sand 4,175 ft., Arbuckle 4,213 ft.

Palmer 1 Sims, NW NW SE 20-24s-12w, elev. 1,890 ft. DF and 1,887 Gr., dry, TD 4,172 ft., Heebner 3,351 ft., lime 3,504 ft., Lansing-Kansas City 3,524 ft., Kinderhook 3,900 ft., Viola 3,941 ft., Simpson 4,058 ft., Arbuckle 4,117 ft.

Finston-Murfin et al., 1 Witt, NW NW NW 1-23s-13w, elev. 1,859 ft., dry, TD 3,820 ft., anhydrite 720 ft., Heebner 3,237 ft., lime 3,375 ft., Lansing-Kansas City 3,393 ft., Sooy 3,655 ft., Viola 3,695 ft., Simpson 3,737 ft., Arbuckle 3,810 ft.

Finston-Murfin 1 Justus, NW NW SE 17-22s-11w, elev. 1,825 ft. DF and 1,823 ft. Gr., dry, TD 3,785 ft., anhydrite 560 ft., Heebner 3,085 ft., lime 3,223 ft., Lansing-Kansas City 3,251 ft., Sooy 3,551 ft., Viola 3,704 ft., Arbuckle 3,719 ft.

Wabaunsee County: Skelly 1 Thoewe, SE NW SE 2-13s-10e, elev. 1,112 (?) ft., dry, TD 3,162 ft., Howard 588 ft., Topeka 659 ft., Heebner 980 ft., Lansing 1,234 ft., Kansas City 1,374 ft., base Kansas City 1,595 ft., Cherokee 1,855 ft., Mississippi lime 2,191 ft., Kinderhook 2,507 ft., Hunton 2,706 ft., Maquoketa 2,875 ft., Viola 2,950 ft., Simpson 3,040 ft., Simpson sand 3,073 ft., Arbuckle 3,144 ft.

Appalachian Field

Large Gasser Reported For Clinton County

PITTSBURGH.—The Leidy Township, Clinton County, Pennsylvania, new Oriskany sand pool reported the largest gas well brought in to date: New York State Natural Gas Corp., N-188 Ralph P. Daugherty, elevation 1,479 ft., tested more than 44,000,000 cu. ft., rock pressure 4,100 psi., Onondaga lime 6,066 ft., Oriskany sand 6,085 ft., gas 6,086 ft., total depth 6,086 ft. Georges Township, Fayette County, Orville Eberly et al., 1 N. E. Murphy, elevation 2,560 ft., has been shut down at 8,033 ft. This well will be shot in the gas show which was encountered between 7,787 and 7,792 ft. in the chert. Napier Township, Bedford County, South Penn et al., Snee & Eberly 1 Jesse B. Miller, elevation 1,666 ft., is drilling at 7,400 ft. Unity Township, Westmoreland County, Peoples Natural Gas Co. 1-3921 Fred Musnug, elevation 2,100 ft., is drilling at 4,519 ft.

Five new locations in Southwest Pennsylvania were reported during the past week: Kiskiminetas Township, Armstrong County; Piney and Porter townships, Clarion County; South Franklin and South Strabane townships, Washington County.

Steele district, Wood County, West Virginia, Limestone Hill area, Hope Natural Gas Co. 9445 Frank Gilmore, elevation 1,016 ft., gaged 15,006,000 cu. ft. of gas, natural, Corniferous lime 5,133 ft., Oriskany sand 5,242 ft., gas 5,242-62 ft., total depth 5,263 ft. Godfrey L. Cabot, Inc., 1329 O. E. Crow, is drilling at 3,846 ft. Columbian Carbon Co. 1148 Godfrey L. Cabot (McLane tract), topped the Corniferous lime at 4,912 ft.; 1153 Godfrey L. Cabot (Stephens tract), drilling at 3,046 ft.; 1154 H. C. McPherson et al., drilling at 1,974 ft. United Fuel Gas Co. 6588 L. E. Blair drilling at 4,712 ft. W. & B. Gas Co. 1 Elbert and Myrtle Hale drilling at 1,900 ft. In Tucker district, Wirt County, Godfrey L. Cabot, Inc., 1328 fee (W. T. Gant tract), ran the 10-in. casing at 1,547 ft.; Louis E. Reed 1 Earl Tanner is drilling at 1,495 ft. Beaver Pond district, Mercer County, United Fuel Gas Co. 6478 A. W. Hicks, elevation 2,834 ft., is dry; Big lime 1,752-3,092 ft., Weir sand 3,174-3,267 ft., gas 3,183-87 ft. tested 26,000 cu. ft. 22 hours after shot; Berea sand 3,925-56 ft., total depth 4,014 ft.

WEST VIRGINIA SUCCESSFUL WILDCAT

Wood County, Steele district: Hope Natural

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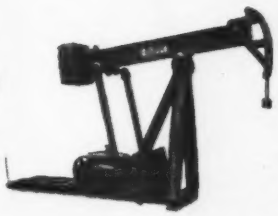

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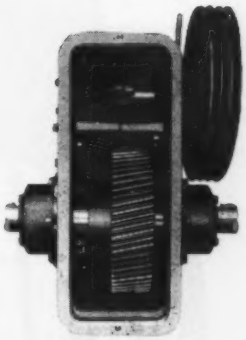

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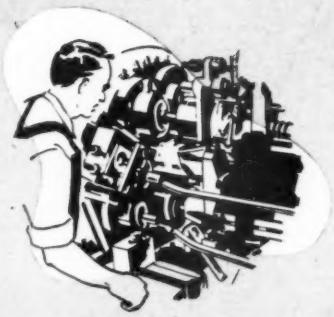

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Gas Co. 9445 Frank Gilmore, elev. 1,016 ft., 15,006,000 cu. ft. of gas, natural, Corniferous lime 5,133 ft., Oriskany sand 5,242 ft., gas 5,242-62 ft., TD 5,263 ft.

WEST VIRGINIA WILDCAT FAILURE

Mercer County, Beaver Pond district: United Fuel Gas Co. 6478 A. W. Hicks, elev. 2,834 ft., dry, Big lime 1,752-3,092 ft., Weir sand 3,174-3,267 ft., gas 3,183-87 ft., tested 26,000 cu. ft. 22 hr. after shot, Berea sand 3,925-56 ft., TD 4,014 ft.

Eastern Texas

Gas Discovery Sets Off Limestone County Play

DALLAS.—Great Expectations Oil Corp., Fort Worth, completed its shallow Limestone County gas discovery just west of Mexia oil field, and was drilling ahead at a second Woodbine wildcat 2 miles north of Tehuacana.

The completion was 1 J. P. Key, which entered the Woodbine at 2,711 ft., the Buda at 2,972 ft., then plugged back to 2,748 ft. The 5-in. casing was perforated with 72 shots from 2,727-40 ft. and calculated open flow potential was 30,000,000 cu. ft. of gas daily. Before plugging back, cores from 2,722-40 ft. recovered 7 ft. of shale and 1 ft. of hard limestone with streaks of oil-stained sand, but a drill-stem test of the section recovered salt water with very light oil show.

The company's new well is the 2 S. N. Forrest, a 3,000-ft. Woodbine wildcat in the J. G. Minor Survey, north of Tehuacana. It is about 7 miles north of the 1 Key, and 1,000 ft. northwest of the firm's 1 S. N. Forrest, which was last reported at 2,910 ft. with no shows.

A 1,100-ft. exploration for northern McLennan County has been scheduled by C. P. Quinlan, Tulsa. It is the 1 R. R. Prause, spotted 165 ft. from west and 2,200 ft. from south lines, University Lands Survey, and about 2 miles west of the West townsite.

In Anderson County, Cooper-Herring Drilling Co. and E. L. Howard, had drilling under way at their 1 Odell Clewis, Woodbine exploration 9½ miles east of Slocum in the A. Hendley Survey, A-1,115. Top of the Woodbine is expected around 5,500 ft. According to field sources, the only other test in the area is Bobby Manziel's 1 M. A. Davey, Washington Lewis Survey, which was drilled earlier this year to 5,660 ft. The 1 Davey found top of the Woodbine at 5,410 ft., which carried salt water.

In western Harrison County, roads, pits, and substructure have been completed at Skeeters and Curry Drilling Co. 1 W. T. Cock, a shallow exploration in the J. R. Davis Survey, near the Sabine River. Location for the new test is 1,231 ft. due east from the 15-year old Cock test which was started in 1934, and which was finally bottomed at 2,595 ft. The well blew out from an undetermined horizon while operators were trying to run casing to 2,350 ft. It was said to have changed ownership several times over the next 2 years, and to have defied all efforts at completion. It was finally abandoned after considerable loss of equipment in the hole while trying to clean out for testing. Projected depth of the new test was 4,500 ft., unless the Woodbine is productive above that depth.

EAST TEXAS (DISTRICTS 5, 6, and 6-P) SUCCESSFUL WILDCAT

Limestone County: Great Expectations Oil Corp. 1 J. P. Key, 89-acre tract, Rozelia Scott Sur., 4 mi. W Mexia, TD 2,987 ft., PB 2,748 ft., elev. 512 ft., perf. Woodbine 2,727-40 ft., flowed 30,000,000 cu. ft. gas daily, calculated potential open flow, bottom-hole flowing pressure 1,464 psi.

EAST TEXAS (DISTRICTS 5, 6, and 6-P) WILDCAT FAILURES

Limestone County: Great Expectations 1 James Anglin, P. Varella II League Grant, 4 mi. W Mexia, dry, TD 3,145 ft., elev. 450 ft.

Rusk County: McAlester Fuel Co. 1-A Bennetta Purse, Dan Martin Sur., A-526, 4½ mi. SW Tatum, dry, TD 7,293 ft., elev. 307 ft., Navarro 1,571 ft., Nacatoch 1,792 ft., Pecan Gap 2,113 ft., base Annona 2,337 ft., Tokio 2,633 ft., Austin 2,908 ft., Comanche 2,992 ft., Fort Worth 3,129 ft., Duck Creek shale 3,290 ft., lime 3,411 ft., Kiamichi 3,602 ft., Goodland 3,667 ft., Paluxy 4,060 ft., upper Glen Rose 4,167 ft., Massive anhydrite 5,685-5,833 ft., James 6,310-6,440 ft., Pettit 6,561 ft., Travis Peak 6,890 ft.

The Texas Co. 1 Clem Clarke, Wm. Howeth Sur., 2 mi. SW Pine Hill, dry, TD 7,725 ft., elev. 449 ft., Austin 3,016 ft., Comanche 3,165 ft., Goodland 3,885 ft., Paluxy 4,126 ft., upper Glen Rose 4,335 ft., Pettit 6,735 ft., porosity 6,832 ft.

The Texas Co. 1 Mrs. Fannie Sorrells, Thomas Williams Sur., 1 mi. SW Mt. Enterprise, dry, TD 7,814 ft., elev. 450 ft., Massive anhydrite 5,950-6,160 ft.

South Louisiana

Louisiana Producing Depth Record Broken by Shell Well

NEW ORLEANS.—In the Weeks Island field of Iberia Parish, Shell Oil Co. has broken the Louisiana producing depth record at its 2 Weeks Gall State Unit. Through perforations at 15,122-37 ft., the well produced 538 bbl. of 30°-gravity oil daily on initial test. Tubing pressure was 2,775 psi. The well is bottomed at 15,361 ft.

A new pay has been tapped in the new Phoenix Lake field of Calcasieu Parish at Ohio Oil Co. 3 E. W. Brown, Jr., 21-11s-13w. On initial production test through perforations in the "B" sand at 7,982-86 ft., the well flowed 250 bbl. of 42.4°-gravity oil per day, plus 110,000 cu. ft. of gas, through a 11/64-in. choke. Tubing pressure was

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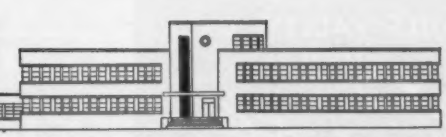

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1,000 psi., and casing pressure 1,370 psi. The well was drilled to a total depth of 8,066 ft., and operators set 7-in. casing at 8,065 ft.

Shell Oil Co. is preparing to test its 1 Vivian J. Gianelloni, 47-8s-1e, East Baton Rouge Parish wildcat, located 5 miles west-southwest of Hope Villa townsite. The well is at total depth of 12,100 ft. and operators will test through perforations at 10,876-90 ft.

Southern Six Drilling Co. is moving in materials to make a third attempt to discover production 1½ miles south and east of Franklin townsite, St. Mary Parish. Location has been staked for 3 W. Prescott Foster in 12-15s-10e. The new wildcat is ¾ mile southeast of two previous holes which were abandoned as dry. Sparta Oil Co. drilled 1 Foster to a depth of 1,840 ft. and abandoned after pipe parted and crews were unsuccessful in attempt to clean the hole. Sparta then skidded rig 25 ft. west and drilled 2 Foster which was abandoned as dry at 11,516 ft.

SOUTH LOUISIANA SUCCESSFUL WILDCATS

Iberia Parish: Shell Oil Co. A-7 Weeks Island State, 13-14s-6e, TD 10,016 ft., top pay 3,742 ft., perf. 3,742-50 ft., IP 127 bbl. oil per day, 10/64-in. choke, 32.4° gravity, TP 100 psi.

Rapides Parish: Texas Pacific Coal & Oil Co. 1 W. W. Elliott, 35-1s-2w, 4 mi. S and 2 mi. E of Glenmora, TD 10,812 ft., top pay 10,698 ft., perf. 10,698½-10,713½ ft., IP 191 bbl. oil per day, 39.4° gravity, 8/64-in. choke, TP 2,600 psi. Discovery well of Glenmora.

SOUTH LOUISIANA WILDCAT FAILURES

Ascension Parish: The Texas Co. 1 Dan B. Morgan et al., Unit, 21-9s-3e, dry, TD 11,310 ft.

Cameron Parish: The Texas Co. 1 State Lease 1,765, Comegys et al., Unit, 13s-13w, dry, TD 10,443 ft.

West Feliciana Parish: H. L. Hunt 1 E. M. Percy, 88-2s-3w, 4 mi. N and 4 mi. W of Calapa townsite, dry, TD 11,113 ft.

Texas Gulf Coast

New Pool Opened and Two New Pays Established

HOUSTON.—A new oil pool has been opened in Jackson County at Gulf South Oil Corp. 1 Niebuhr et al., T. M. Dorsett Survey, approximately 1 mile northeast of Little Kentucky field. The well was perforated at 5,736-40 ft., and through a 7/64-in. choke flowed 103 bbl. of oil per day. Tubing pressure was 750 psi. and casing pressure 1,050 psi. After cleaning out, the well was shut in for storage, and potential gage will be made when storage is built.

Dan J. Harrison, Jr., has opened a new pay in the Nash Dome field, Brazoria County, at 3 Belle Wisdom estate. The well was drilled to a total depth of 4,114 ft., and on a 24-hour potential test it flowed 115 bbl. of 20.5°-gravity oil per day through a 9/64-in. choke. Production is through perforations at 4,109½-13 ft. The well is located in the H. N. Cleveland Survey.

New pay has been tapped on the northwest flank of South Liberty field at L. M. Josey et al., 2 Trinity River Bed-State. On a 24-hour potential gage, through perforations from 7,200-7,384 ft., the well flowed 240 bbl. of 36.5°-gravity oil per day through 12/64-in. choke. Production is from the Cook Mountain No. 1 sand.

Armstrong & Sutton Drilling Co. has completed 1 F. A. Kremel, Samuel Millett League, Abstract 70, for a new oil discovery in the North Cistern area of Fayette County. The well was drilled to a depth of 1,159 ft. and operators set 4½-in. casing at 1,128 ft. and the open hole from 1,128-59 ft. was gravel packed. The well flowed an estimated 40 bbl. of oil per day and is now shut in waiting on final gage.

C. N. Housh and American Republics Corp. is drilling below 6,000 ft. in its closely watched wildcat, 1 Pearl Wooten, James Haddon League, Colorado County. The test is projected to 12,000 ft. It is located approximately 5 miles south of Columbus field and 12 miles southwest of the recently discovered New Ulm field.

TEXAS GULF COAST (DISTRICTS 2 AND 3) SUCCESSFUL WILDCATS

Austin County: G. S. Hammonds 1 Walter Schneider, James Cummings Sur., A-31, 5 mi. NE Cat Springs, TD 11,062 ft., top pay 10,061½ ft., perf. 10,061½-71½ ft., IP 135 bbl. oil per day, ¼-in. choke, TP 250-550 psi., CP 900-1,200 psi., 42.3° gravity.

Bee County: Ben D. Marks, Trustee, 1 J. H. O'Connor, Phoebe Crain Sur., A-16, 4 mi. N of Skidmore, TD 4,260 ft., top pay 4,218 ft., perf. 4,218-36 ft., IP 128 bbl. oil per day, 10/64-in. choke, TP 340 psi.

Brazoria County: Dan J. Harrison, Jr., 3 Belle Wisdom est., H. N. Cleveland Sur.,

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Goliad County: Kirkwood & Morgan, Inc., 2 B. & C. Wilkinson, W. P. Miller Sur., TD 3,236 ft., top pay 2,814 ft., perf. 2,814-20 ft., IP 59 bbl. oil per day, ½-in. choke, TP 75 psi., CP 325 psi., 21.7° gravity.

TEXAS GULF COAST (DISTRICTS 2 AND 3) WILDCAT FAILURES

Hardin County: Stephens Petroleum Co. 1 Nona Mills Co., R. A. Thompson Sur., A-594, Nona Mills area, dry, TD 8,850 ft.

Liberty County: Hinkle Drilling Co. et al., 1 Holmes & Davis, Moss Bluff dome, James McFadden Sur., A-76, dry, TD 4,020 ft.

Live Oak County: Atlantic Refining Co. 1 L. A. Reagan et al., AB&M Sur. 223, 4 mi. N Chapman Ranch, dry, TD 9,003 ft.

Walker County: L. M. York 1 Luther E. Hall, C. A. Sleight Sur., A-496, 2 mi. W of New Waverly, dry, TD 3,630 ft.

California

Locations Staked Near Cuyama Valley Discovery

LOS ANGELES.—With the discovery well yet to be completed, two offsets to Hancock Oil Co.'s wildcat in the northwestern Cuyama Valley area were staked last week.

The discovery, about 2¾ miles northwest of the slowly expanding Morales field which was opened last April, at last reports was coring at 6,163 ft. Earlier in the week on a test of sand sections between 5,873-6,027 ft., with casing set at 5,785 ft., the well flowed oil by heads at the rate of about 400 bbl. daily. Thus while a producer seemed assured, the operator elected to drill deeper.

The two stepouts announced were Universal Consolidated Oil Co. 55-31 Humble, a southeastern offset, and its No. 81-36 Humble about ⅝ mile to the northwest. The discovery, Hancock 44-31 Hancock-Bishop, is located in SE NW 31-32s-20e.

In Morales field, which now has two producers in the deeper Superior pool and nine in the 2,400-ft. Clayton pool, development activity is increasing. Richfield Oil Co. moved in equipment for a northwest offset to the Superior discovery. It also stake dlocation for a ½-mile southwest extension try to Clayton pool. Bulk of activity in the Cuyama area is still centered in South Cuyama field, however, where 12 rigs are at work.

At another apparently assured discovery, The Texas Co. 1 Honor Farm in the Castaic area of northern Los Angeles County, the operator also was taking a look at lower horizons before attempting to complete. Following a drill-stem test which indicated a 500-bbl. producer from a sand section at 5,313-3 3ft., hole was cored and drilled deeper about 400 ft.

General Petroleum Corp. removed its No. 44-14 Boston Land Co. from the "no dope" list as testing was started at the wildcat in the Huron area of Fresno County last week. With hole drilled to 13,621 ft. and casing set at 13,330 ft., the first test was a 2-ft. interval at 13,258 ft. Only water was recovered so that the operator will continue with other tests up the hole.

Nevada activity.—With one deep test now drilling in the Newark Valley area of White Pine County, northeastern Nevada may have two new wildcats under way in the near future. The drilling wildcat, Continental Oil Co. and Standard Oil Co. of California 1 Meridian Unit in 31-16n-56e, at the weekend was drilling below 4,225 ft. Second wildcat announced was by

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McCarthy Oil Co. of Elko, planned for the Halleck area of Elko County or about 18 miles northeast of the town of Elko. A third test, according to reports from the area, shortly will be staked near Pogue Springs to the southwest of the Continental test.

CALIFORNIA SUCCESSFUL WILDCAT

Kings County, Hanford area: Goshen Syndicate 2 Drummond-Union, 36-18s-22e, flowed at 100 bbl. per day rate from perforations at 5,244-48 ft. and 5,244-52 ft. while preparing to install pumping unit, gravity 20.2,° 10/64-in. bean, tubing pressure 160 psi., TD 5,404 ft., elev. 245 ft. New field discovery.

CALIFORNIA WILDCAT FAILURES

Contra Costa County, Martinez area: Ardley Petroleum Co. 3 Almond, 31-2n-2w, dry, TD 3,150 ft., elev. 500 ft.

Humbolt County, Mattole River Valley: Independent Exploration Co. 1 Hindley, 36-3s-1w, dry, TD 2,280 ft., elev. 500 ft.

Imperial County, Truckhaven area: Mortimer & Rasmussen 1 Truckhaven, 10-11s-10e, dry, TD 2,543 ft., elev. 115 ft.

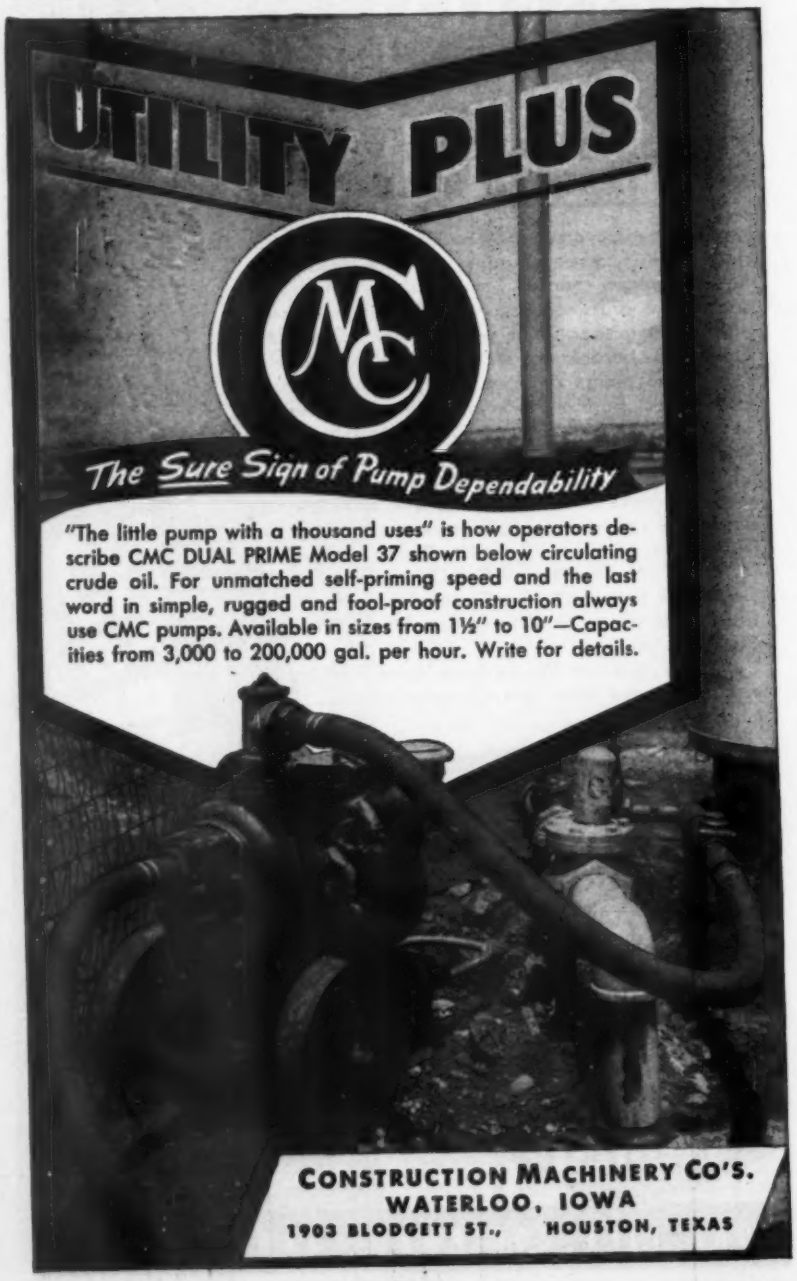
Kern County, Southwest Bacon Hills area: Trico Oil & Gas Co. 18 Trico-Independent-Theta, 29-28s-20e, dry, TD 2,370 ft., elev. 1,173 ft.

Placerita Canyon area: F. E. Ellis 1 Lowe, 36-4n-16w, dry, in Saugus on core at 1,997-2,021 ft., TD 2,587 ft., elev. 1,205 ft.

San Francisquito Canyon area: Fox M. Boswell et al., 1 Ruiz, 27-5n-16w, dry, TD 2,100 ft., elev. 1,310 ft.

San Luis Obispo County, Carrizo Plains area: Pacific Oil & Gas Development Corp. 45-8 McDonald, 8-29s-19e, dry, bottomed in Paso Robles, TD 6,844 ft., elev. 2,700 ft.

Santa Barbara County, Goleta area: W. J. Carter 1 Carter-Prevedello, 36-5n-28w, dry, TD 3,000 ft., elev. 816 ft.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Rocky Mountain

Fort Morgan Area Gets Confirming Well in Muddy

DENVER.—J. M. Huber Corp.-Adams Drilling Co. confirmed oil production in their Fort Morgan area field with a flowing well on drill-stem test in the Muddy at their second well in the area. The well is 1-A Lee, NW NE SE 2-2n-57w, one location south of the Muddy sand discovery well. Muddy was topped at 5,441 ft. in the new well and on drill-stem test 5,439-59 ft., open 1 hour, there was gas in 3 minutes and the well flowed in 22 minutes. The flow was an estimated 25 bbl. of oil per hour with 2,000,000 cu. ft. of gas daily. Shut-in pressure was 1,400 psi. and flowing pressure was 750 psi. On the Muddy sand the well is structurally level with the discovery. Northeast of this field Trigood Oil Co. also tested oil on drill-stem test at its second well in the Merino area. This well is 1-J Couch, SE SW SE 19-6n-54w, ¼ mile west of its Dakota sand discovery well. On drill-stem test 5,100-10 ft., the well made 2,900 ft. of oil and 170 ft. of oil-cut mud in 1 hour. Trigood is running casing for completion. There is no test reported on the discovery well at 1 Couch, which flowed on tests.

Possibility of a new gas field in the Mesaverde (Upper Cretaceous) is indicated at the Amerada Petroleum Corp. 1 Unit, C SW SE 39-16n-90w, wildcat in the Deep Creek area, Carbon County, Wyoming. On drill-stem test 2,430-64 ft., there was gas at the surface in 5 minutes and the well flowed at the rate of one-half million cubic feet of gas daily. On test at 2,462-74 ft., the well flowed at the rate of 10,000,000 cu. ft. daily. Amerada is drilling below 3,600 ft. on the well, with the well planned as a test of Dakota-Lakota series sands at around 8,000 ft. Sinclair Oil & Gas Co., as well as Amerada, has done shooting in this area of the state, but there had been no previous deep tests through this area of the Red Desert basin. The wildcat is northeast of Powder Wash field, which produces gas from Tertiary sands.

Casing has been cemented on the basal Green River zone at Carter Oil Co.- Stanolind Oil & Gas Co. second well in the Roosevelt area. The well is 2 Ute Tribal, C NW SE 21-1s-1e, ½ mile east of the discovery well. The well was drilled to 9,393 ft., total depth, with 7-in. casing cemented at 9,080 ft. On 6-hour test at 9,281-9,342 ft. the operator recovered 2,020 ft. of oil and on test at 9,083-9,102 ft. the recovery was 4,750 ft. of oil in 3½ hours. The discovery well on this structure flowed more than 1,600 bbl. of oil daily. West of Roosevelt at Bluebell the same operators are drill-stem testing a zone in basal Green River formation at 8,767 ft., total depth. This well is 1 Unit, C SE NE 6-1s-2w, and continues the series of deep tests throught this area of the Uinta basin. A core at 9,725-9,767 ft., showed with staining, and other tests up the hole have also shown small amounts of oil. The majority of the sections tested to the present depth were hard and tight.

In the Manderson area, Wyoming, Pioneer Oil Corp. of Denver will drill a 6,500-ft. Cloverly sand test. National Associated Petroleum Co. plans a 5,000-ft. Newcastle test in the Kara area, Weston County. Kerr-McGee Oil Industries, Inc., has started a three-wildcat series in western Nebraska on blocks farmed out from Stanolind.

WYOMING WILDCAT FAILURES

Natrona County, Hat Six area: Yellowstone Drilling Co. 1 State "A," SW NE SE 1-32n-78w, TD 3,700 ft., plugged and

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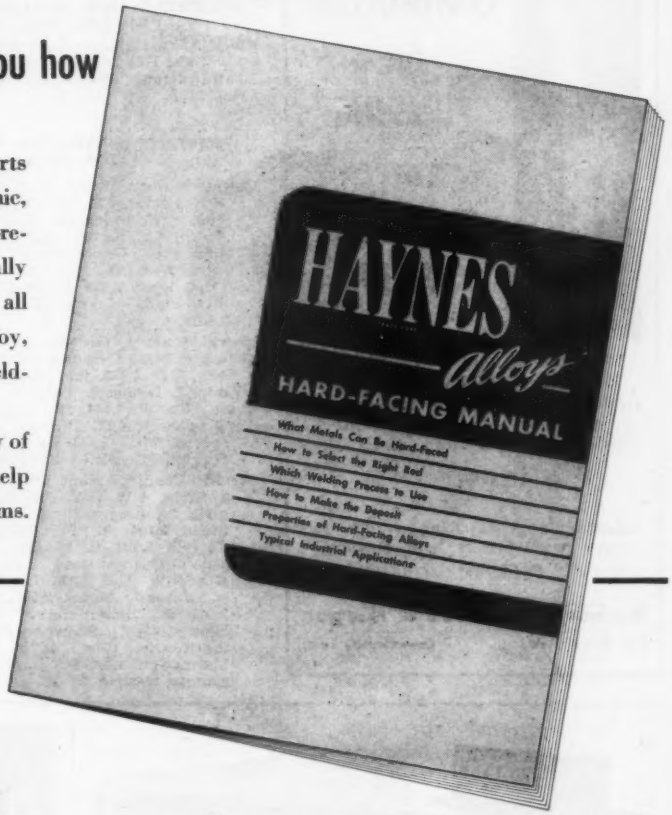

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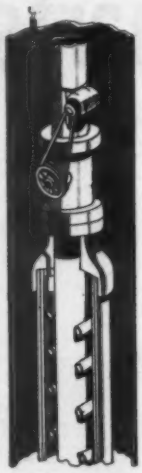

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abandoned, Wall Creek 2,336 ft., Dakota 3,520 ft., Lakota 3,632 ft.

Weston County, West Hay Creek: A. L. Schlaikjer 1 McClure, NW NE NW 14-45n-67w, TD 7,053 ft., plugged and abandoned, Frontier 5,224 ft., Newcastle 6,709 ft., Dakota 6,934 ft., Lakota 7,038 ft.

NORTHERN NEW MEXICO WILDCAT FAILURE

Rio Arriba County, Rosa Unit: Stanolind 2 Unit, SW SW SE 11-31n-6w, TD 3,457 ft., temp. abandoned, Picture Cliffs 3,158 ft.

WESTERN NEBRASKA WILDCAT FAILURES

Dawes County, Ester area: Matt Newell 1 Marchant, SE SE NE 18-30n-48w, TD 2,661 ft., plugged and abandoned, Pierre 648 ft., Timpas 1,578 ft., Codell 1,680 ft., Greenhorn 1,924 ft., first sand 2,125 ft., second sand 2,200 ft., third sand 2,279 ft., fourth sand 2,312 ft., Skull Creek, 2,366 ft., Dakota 2,637 ft.

Morrill County, Greenwood Creek: Mathers & Neff 1 Kennan, C NW SE 8-17n-50w, TD 4,875 ft., plugged and abandoned, Niobrara 3,820 ft., Timpas 4,011 ft., Codell 4,134 ft., Carlyle 4,144 ft., Greenhorn 4,327 ft., first sand 4,600 ft., second sand 4,638 ft., third sand 4,750 ft., Skull Creek 4,793 ft., Dakota 4,834 ft.

Perkins County, Grant area: Ohio Oil Co. 1 State, NW NW SW 16-10n-39w, TD 5,345 ft., plugged and abandoned, Niobrara 2,104 ft., Fort Hayes 2,406 ft., Carlyle 2,526 ft., Greenhorn 2,655 ft., top Graneros sand 2,790 ft., bottom Graneros sand 3,096 ft., Cloverly 3,178 ft., Jurassic series 3,510 ft., Cimarron 3,662 ft., Stone Corral 3,878 ft., Big Blur 4,112 ft., Shawnee 4,607 ft., Lansing-Kansas City 4,750 ft., Bronson Marmotion 4,900 ft., Cherokee 5,162 ft., granite wash 5,335 ft.

Southwest Texas

New Gas Sand Discovered In Mariposa Oil Field

CORPUS CHRISTI.—Frank W. Michaux and Sterling Oil & Refining Co. have discovered a new gas sand in Mariposa field of Brooks County at their 1 Sullivan The well was completed for 9,900,000 cu. ft. of gas per day on open flow potential. Production is through perforations at 6,543-52 ft. Tubing pressure was 1,750 psi., and shut-in pressure 2,410 psi. Hole is bottomed at 9,003 ft.

Superior Oil Co. is preparing to run production test of its wildcat, 1 Odem, ½ mile northeast of Sinton, San Patricio County. Operators ran a drill-stem test at 6,504 ft. and recovered only salt water. They have now set 5½-in. casing at total depth of 8,344 ft. and will perforate the interval 6,935-43 ft. for production test.

Sunray Oil Corp. is preparing to core at 2,400 ft. in its Webb County wildcat, 1 J. O. Walker, Survey 684, 10 miles northeast of Oilton. Sand with oil odor was cored from 2,125-35 ft. Drill-stem test was run at 2,129-35 ft. and recovery was 900 ft. of brackish water and 120 ft. of mud with slight oil scum.

In Jim Hogg County, Pontiac Refining Corp. 1 Y. Vela Cuellar, W. M. Clay Survey 576, A-162, is still testing, after having swabbed an estimated 100 bbl. of fluid per day, being half water and half oil-water emulsion. A net of 30 bbl. of 18°-gravity oil per day was produced on the swab test, which was made from a gravel-packed open hole at 1,754-62 ft.

SOUTHWEST TEXAS (DISTRICTS 1 AND 4) WILDCAT FAILURES

Bexar County: Rollin V. Hill, Jr., 1 George Rawlings, et ux., M. Mortaris Sur. 7,

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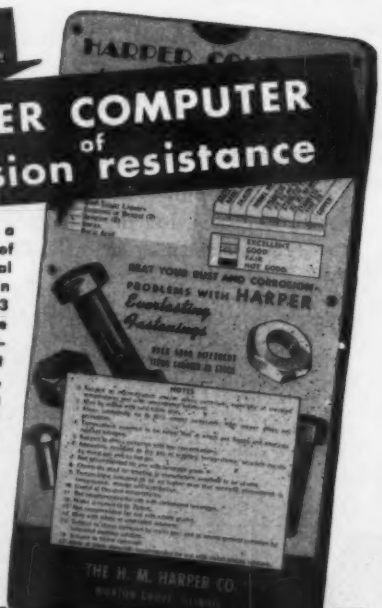

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14 mi. SE of San Antonio, dry, TD 1,940 ft.

McMullen County: Harold K. Boysen B-1 Walker, BS&F Sur. 106, A-1,149, 14 mi. NW of Freer, dry, TD 1,920 ft.

Nueces County: Southern Minerals Corp. and Arkansas Fuel Oil Co. 1 Estella Cage, Geo. H. Paul subd. of Driscoll ranch, dry, TD 8,515 ft.

Starr County: Continental Oil Co. 2 Charles Champion et al., Porcion 99, A-270, 22 mi. NE of Rio Grande City, dry, TD 7,016 ft.

Webb County: Sunray Oil Corp. 1 O. W. Killam, GC&SF Sur. 1,808, 14 mi. E of Laredo, dry, TD 13,706 ft.

Michigan

Promising Dundee Producer Northeast of Fork Pool

MOUNT PLEASANT.—A promising Dundee oil pay was logged at I. W. Hartman 1 Manley, SE NE SE 33-17n-7w, Orient Township wildcat, Osceola County, early this week.

Dundee top (dolomite) was logged at 3,788 ft., and first oil and gas showed at 3,788½ ft. Hole carried 600 ft. of free oil in 2 hours and 1,500 ft. in 22 hours. Hole was drilled to 3,791½ ft. at which point hole was swabbed. Well flowed during this operation, making about 33 bbl. of oil. It was found that pay was contaminated with both pipe scale and uphole shales. The following morning, after well was swabbed and cleaned out with tools, hole carried 1,800 ft. of free oil. The long string of 5-in. casing was set on a shoe at 3,788 ft. before drilling in. Operators decided to cement the casing before testing further.

The Orient wildcat, located about a mile and a half northeast of Fork Dundee oil field, appeared to be either an extension of this older pool or a new field opener. There was divided opinion on whether it was an extension well or a potential discovery. Structurally, well is higher than all correlating dry-hole control points and was about flat with the lowest producing well in the Fork field.

Bulk of the acreage in this new play was held by Hartman and associates, including Howard Atha, H. E. Walton, Columbia Oil & Gas Co. and McClure Drilling Co. Others with either offset or close-in acreage include Roosevelt Oil & Refining Corp., Sohio Petroleum Co., and D. C. Slusser.

Mogul Oil Co. announced its second Richfield horizon test for the big Buckeye Dundee oil pool, Gladwin County. This second test, the 1 Johnson, is located in N½ SE NE 15-18n-1w, Buckeye Township, on the southwest flank of the pool and about a mile south of Mogul 1 Domokos, first deep test in the pool which was drilled to 5,351 ft., total depth. This first Richfield well carried stringer, but not commercial, oil pays in the Richfield.

MICHIGAN WILDCAT FAILURES

Allegan County, Manlius Township: William C. Vandenberg, Jr., 1 Kool & Struker Comm., NE SE SW 16-3n-15w, Traverse 1,360 ft., dry, TD 1,570 ft.

Gladwin County, Tobacco Township: Stork Oil Co. 1 Uhl, SE SE SE 15-17n-1w, dry in red rock, TD 1,475 ft.

Ionia County, Campbell Township: C. J. Trace 1 Burleigh, NE SW SW 32-5n-8w, Traverse 2,076 ft., dry, TD 2,128 ft.

North Plains Township: James E. Hood 1 Cusack, NW NE SW 10-8n-5w, Dundee 3,002 ft., dry, TD 3,113 ft.

Kalkaska County, Clearwater Township: Mogul Oil Co. 1 State-Clearwater, S½ SE SE 17-27n-5w, dry in Richfield, TD 4,261 ft.

Newaygo County, Lincoln Township: Sun Oil Co. 2 Schmidt, NW NW NW 1-14n-13w, Traverse 2,561 ft., dry, TD 2,697 ft.

Oceana County, Grant Township: H. E.

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Walton 1 Hacker, NE NE SW 1-13n-17w. Dundee 2,401 ft., dry, TD 2,413 ft.

Van Buren County, Waverly Township: Collins Oil Co. 1 Rademacher, NW SW NW 13-2s-14w, Traverse 1,221 ft., dry, TD 1,271 ft.

Permian Basin

Wolfcamp Pay Added to East Vealmoor Field

MIDLAND.—Wolfcamp pay was added to East Vealmoor field of Howard County at Sunray Oil Corp. 3 W. L. Wilson, (formerly Barnsdall), in SE NE 16-37-H&TC, and the well was finished as a dual competion. Total depth was 7,476 ft. On elevation of 2,490 ft., Wolfcamp pay was 6,905 ft., and reef pay was 7,456 ft. Completion from the upper pay was 745 bbl. of 39.7°-gravity oil a day, through 18/64-in. choke, from perforations at 6,910-60 ft. Gas-oil ratio was 804 cu. ft., and flowing pressures were 575 psi on tubing and 625 psi. on casing. Reef perforations were not reported. Casing was set on bottom and potential was 192 bbl. of 43.7°-gravity oil a day through ¼-in. choke.

In Kelly-Snyder field, Scurry County, Skelly Oil Co. 6 W. H. Parrish, SE SE 385-97-H&TC, was a dual completion from two sections of the Strawn. Completed without acid, the well flowed 1,572 bbl. of 40?-gravity oil a day through ¾-in. choke from "B" zone perforations at 7,393-7,419 ft., and 385 bbl. of 43°-gravity oil a day through ½-in. choke from open hole in the "C" zone from 7,492-7,502 ft., total depth.

Wolfcamp production was developed on a drill-stem test at Cosden Petroleum Corp. 1 G. K. Holbein, 44-35-H&TC, on the south side of the Reinecke reef area in southeastern Borden County. Operators reported a soft section around 6,366 ft., which attempted to blow out. It was drilled to 6,370 ft., and with packer at 6,358 ft., tested for 63 minutes. Gas came to the surface in 3½ minutes and oil in 38 minutes, which flowed at an estimated rate of 20 bbl. an hour for the remainder of the test. The well also unloaded oil while pulling pipe. Recovery was 500 ft. of oil-cut mud. Drilling continued below 6,379 ft.

In northeast Howard County, Shell Oil Co. 1 M. H. O'Daniel, SE SW 2-30-T1N-T&P, Pennsylvanian discovery, completed flowing 404 bbl. of 46°-gravity oil a day through ¾-in. choke from perforations at 7,995-8,005 ft. The well had been drilled to the Ellenburger, which carried sulfur water, and was plugged back from 8,780 to 8,010 ft.

George P. Livermore and Texas Pacific Coal & Oil Co. 1 W. B. Currie, north central Howard County wildcat, was coring below 6,847 ft. in the Dean sand, topped at 6,822 ft., on elevation of 2,625 ft.

In Hockley County, Humble Oil & Refining Co. 1 J. J. Hobgood, 8 miles northeast of Yellowhouse field, was drilling below 9,008 ft. in dolomite and chert. A drill-stem test from 8,399-8,428 ft. recovered drilling fluid with a trace of oil, and a test from 8,427-70 ft. recovered mud and salt water.

In new Ropes field, Honolulu Oil Corp. and Signal Oil & Gas Co. 1 Hopper, north offset to the field discovery, cored 10 ft. of dense lime and 10 ft. of slightly porous lime from 9,322-42 ft., and 11 ft. of porous lime from 9,342-62 ft. It was drill-stem testing to 9,362 ft. The same operators 1 Emmons, east offset to the discovery, was drilling lime and shale at 8,170 ft.

Tide Water Associated Oil Co. has announced its decision to drill its 1-B Pitchfork Ranch in King County, as the first of two Ellenburger exploratory wells on its 118,000-acre spread in Dickens and King counties. Reports last week indicated the first test would be on the Dickens

County side, and about 15 miles northeast of the town of Dickens. Tide Water had option of the two locations. Location for the 1-B Pitchfork Ranch is 2,047 ft. from west and 3,383 ft. from south lines of Block 143, BS&F Survey, 12 miles northwest of Guthrie. Contract depth was 7,500 ft. The drillsite is 2½ miles northeast of Superior Oil Co. 1 Pitchfork, Block 171, J. H. Gibson Survey, which was drilled dry in 1946 to 7,145 ft., 3 ft. in the pre-Cambrian.

Twelve miles southwest of Guthrie, King County, Continental Oil Co. 1 Mary Martin, 167-F-H&TC, was drilling below 6,595 ft. in hard limestone. On elevation of 1,847 ft. it had top of the Mississippian at 6,441 ft.

In Borden County, Castleman & O'Neill and Walter Duncan 1 L. D. Rodgers, 29-31-T3N-T&P, Pennsylvanian reef discovery 4 miles northeast of Vealmoor field, and about 1¼ miles north of the Howard County line, drilled ahead 9 ft. and drill-stem tested for 2 hours and 5 minutes from 7,948-75 ft. Gas showed in 6 minutes and recovery was 200 ft. of oil and 550 ft. of heavily oil and gas-cut mud, with no water. Five-inch casing had been set at 7,964 ft. Operators were to run tubing and swab for production tests.

WEST TEXAS (DISTRICTS 8 AND 7-C) SUCCESSFUL WILDCATS

Crockett County: C. A. Hurst and Jack Holt 2 C. J. Fuller est., N½ NE NW 4-A3-D. Savage Sur. 4, 2½ mi. NE Vaughn field, TD 1,246 ft., elev. 2,606 ft., San Andres lime pay 1,232 ft., pumped 20.7 bbl. 34°-gravity oil a day.

Reagan County: Stanolind Oil & Gas Co. 1-BL University Lands, new pay SW side Big Lake field, TD 8,940 ft., elev. 2,144 ft., Fusselman 8,887 ft., pay 8,879 ft., casing 8,867 ft., flowed 257 bbl. 48.6°-gravity oil a day natural, 3/16-in. choke, GOR 7,630 cu. ft., TP 1,600-1,200 psi., CP 2,250 psi.

Runnels County: G. B. Cree 1 O. C. Sykes, Sec. 6, H. Lewis Sur., 5½ mi. SW Aldridge field, 10 mi. E Winters, TD 3,894 ft., elev. 1,960 ft., Gardner sand 3,874-94 ft., flowed 330 bbl. 42°-gravity oil a day natural, 25/64-in. choke, GOR 837 cu. ft., TP 110 psi., CP 500 psi.

WEST TEXAS (DISTRICTS 8 AND 7-C) WILDCAT FAILURES

Borden County: Sunray Oil Corp. 4 W. L. Wilson (formerly Barnsdall), SW NE 36-31-3N-T&P, 2 mi. NW East Vealmoor field, dry, TD 7,818 ft., elev. 2,462 ft., Spraberry 5,360 ft., reef 7,630 ft.

Cottle County: The Texas Co. 1 A. A. Payne, SE SE 15-M-R. M. Thompson Sur., 3 mi. SW Swearingen, dry, TD 8,494 ft., elev. 1,822 ft., base red beds 1,450 ft.

Kent County: Roeser & Pendleton, Inc. 1 Ida Montgomery, 78-98-H&TC, 9½ mi. NE Clairemont, dry, TD 7,105 ft., elev. 1,998 ft., Pennsylvanian 6,429 ft., Mississippian 6,763 ft., Strawn 6,429 ft., Ellenburger by samples 7,009 ft.

Pecos County: Joe G. Sauer and James S. Meriwether 1 Vaughn, 42-10-H&GN, 4 mi. S Imperial, between Lehn-Apco and Masterson fields, dry, TD 1,963 ft. in Queen sand, elev. 2,416 ft., Yates 1,260 ft.

Runnels County: John K. Dorrance and G. W. Strake 2 L. Maples est., C. Montes Sur. 230, 13 mi. SE Ballinger, dry, TD 3,105 ft. in sand, elev. 1,585 ft.

T. D. Humphrey 1 A. C. Ernest, Sec. 79, CTRR Sur., A-112, 3½ mi. W Winters, 1¼ mi. S of North Winters field, dry, TD 4,852 ft., elev. 1,925 ft., Gunsight sand 2,165 ft., Home Creek 3,317 ft., Palo Pinto 3,806 ft., Caddo 4,791 ft.

SOUTHEAST NEW MEXICO WILDCAT FAILURE

Lea County: Hudson & Hudson 1 Amerada-State, SW SW 35-21s-33e, dry, TD 3,705 ft., elev. 3,630 ft., anhydrite 1,558 ft., salt 1,631-3,414 ft., lime 3,517 ft., had fresh water at TD.

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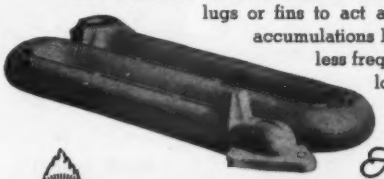

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Testing Continues on Adams County Wildcat

JACKSON.—Danciger Oil & Refining Co. and William Helis have cemented production casing at 6,760 ft. in their 2 George W. Armstrong, 20-5n-3w, Adams County wildcat. A drill-stem test was run in the Barksdale sand zone at 6,539-51 ft. and recovery was salt water. These perforations were squeezed and operators reperforated the upper part of the broken Barksdale section at 6,528-37 ft. Drill-stem test of these perforations was then run using 700 ft. of water cushion and ¼-in. top and ½-in. bottom chokes. The test resulted in only a slight blow at the surface, and at last report, operators were deciding whether to run swab or pull the tubing. Best oil shows in this well were logged in the Parker zone of the Wilcox at 6,434-48 ft., which is considered a thick oil sand for the area.

Lion Oil Co. has released location for its long-anticipated Smackover test in northern Rankin County. Lion 1 Denkmann, C SW NE 22-7n-4E, has a projected depth of 12,000 ft., but it is thought that the test may be drilled considerably deeper than that depth.

In Clarke County, Alabama, Danciger Oil & Refining Co. is drilling below 9,300 ft. in sand at its 1 Frank York, NE SE 1-7n-1w, approximately 1½ miles north of Salipta. Plans for this test call for a 12,500-ft. venture, and it is believed that this depth will be sufficient to penetrate the possibilities of the Smackover formation.

William Helis has completed the best producer to date in Oldenburg field, Franklin County. The well is credited with a daily flow of 324 bbl. of 39.2°-gravity oil. Production is being obtained through perforations in the Tuscaloosa zone at 10,534-46 ft. Tubing pressure was 1,475 psi.

MISSISSIPPI WILDCAT FAILURES

Jefferson Davis County: Humble Oil & Refining Co. 1 Clyde Burkett et al., 13-6n-18w, dry, TD 11,119 ft.

Madison County: The Texas Co. 1 J. M. Hartfield, 35-8n-1e, dry, TD 5,657 ft.

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North Central Texas

SW Nolan County Prospect Recovers Ellenburger Oil

WICHITA FALLS.—Seven miles south and 3 miles west of Maryneal, Sun Oil Co. 1 J. P. Maddox, southwest Nolan County Ellenburger prospect, swabbed and flowed a total of 44 bbl. of oil, with no water, in 13½ hours. Casing pressure was 75 psi. and fluid level was 6,800 ft. After standing overnight, fluid level was 5,300 ft. and casing pressure had increased to 350 psi. First run of the swab recovered 11 bbl. of oil, and swabbing continued from open hole between 7,116-32 ft., total depth.

Location of the well is SW SW 43-1A-H&-TC. On elevation of 2,522 ft., top of the Ellenburger was 7,114 ft., or minus 4,592 ft. First production was on a drill-stem test from 7,117-32 ft., open 1 hour, which recovered 250 ft. of clean oil. Second test at the same interval, open 3 hours, recovered 900 ft. of oil and 240 ft. of oil and gas-cut mud, said to be about 25 per cent oil. Bottom-hole flowing pressure on the test ranged from 200-500 psi., and shut-in pressure was 1,500 psi. The oil was clean 46° gravity.

In northwest Nolan County, Cities Service Oil Co. and Skelly Oil Co. 1 J. P. Cooper, NW NW 41-23-T&P, 1 mile northwest of Roscoe, reported top of the Strawn limestone at 6,740 ft., minus 4,355 ft. First drill-stem test was run from 6,738-66 ft., which had gas in 2 minutes, estimated at 500,000 cu. ft. per day, decreasing to 25,000 cu. ft. Recovery in 3 hours was 540 ft. of clean 45°-gravity oil, 360 ft. of heavily oil and gas-cut mud, and 2,460 ft. of salt water. Operators prepared to run a second test in an effort to shut off the water.

Texas Pacific Coal & Oil Co. 1 W. H. Bennett, NE NW 31-29-T&P, in northeastern Nolan County, recovered 30 ft. of oil-cut mud, being about 5 per cent oil, in 1 hour from 3,769-82 ft. A core from 3,782-91 ft. recovered 6½ ft. of fractured lime with good fluorescence. Drilling continued below 4,128 ft., on a 7,000-ft. contract.

Sun 3 Beatrice K. Stone, NW NW 43-22-T&P, 4 miles west of Sweetwater, was drilling shale and lime at 4,280 ft.

Deep Rock Oil Corp. 1 C. B. Long, Strawn sand prospect, 6½ miles northwest of Norsworthy 1 Wiley, Pennsylvanian discovery, in eastern Stonewall County, was waiting on cement after setting 7-in. casing at 5,124 ft. On elevation of 1,493 ft., the well had top of the Strawn sand at 5,129 ft., and was drilled to 5,137 ft. A 2-hour drill-stem test from 5,130-37 ft. had gas in 23 minutes and recovered 2,400 ft. of clean oil, plus 30 ft. of mud-cut oil. Flowing pressure was 370 psi. and 20-minute shut-in pressure was 1,870 psi. Location is NE NE 2-H-F. T. Oliver Survey, A-1765.

Three miles northeast of Aspermont, C. L. Norsworthy, Jr., 1 D. J. Herbst, was drilling in shale and shells at 6,433 ft. On elevation of 1,796 ft., the following tops were logged: Caddo 6,008 ft., conglomerate 6,120 ft., Ellenburger 6,275 ft. A 2-hour drill-stem test from 6,280-6,406 ft. produced a good blow throughout the test and recovered 2,000 ft. of drilling mud, 1,000 ft. of gas-cut mud, and 1,000 ft. of salty sulfur water.

In Wise County, Greenbrier Oil Co. and others 1 B. P. Vaught, S. G. Evitts Survey, 8 miles northwest of the Daly Caddo and Ellenburger area, and 1½ miles northeast

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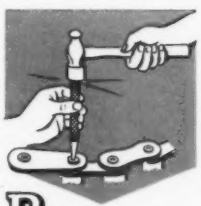
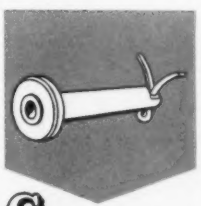
HERE'S HOW SIMPLE IT IS!

A The single pin connector is the heart of the "BA" assembly and is readily identified by its "teardrop" shape. One pin in this link has a cotter on one end; the other end is spun over a washer. The other pin is fully riveted to the adjacent link, thus assuring the assembly of the superior life of riveted chain.



B To take the chain apart, simply remove the cotter on the single pin connector link and drive out the pin. Pin is a slip fit through the chain except for a milled flat on the cottered end which is fitted into a special hole in the connecter plate. There is no danger of destroying fits or damaging parts with this chain.



C The single pin connector of the "BA" assembly fits snugly into place . . . even though it is a slip fit through virtually the entire link. The washer spun over one end of the pin and the milled flat on the cottered end that is fitted into the special hole in the connector plate, plus the cotter, hold the pin firmly in place.

D An important advantage to you is the fact that the other end of the single pin connector link is firmly riveted to the adjacent link. When the single pin connector is removed, this riveted pin holds the chain parts together, preventing plates from falling out and greatly simplifying assembly.

For all the facts on the "BA" assembly, Rex A.P.I. Chains and Rex Oil Field Pumps, see your local supply store or write Chain Belt Company, 1619 W. Bruce Street, Milwaukee 4, Wis.

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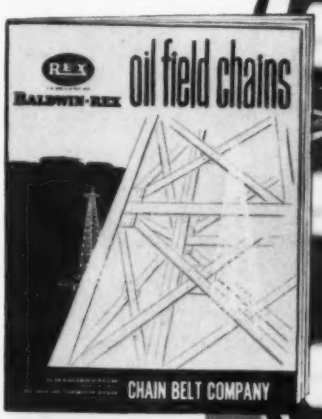

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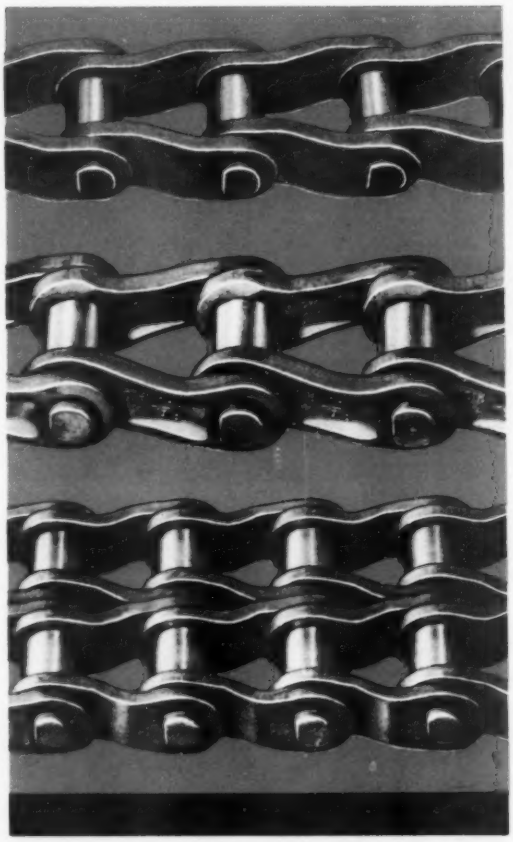

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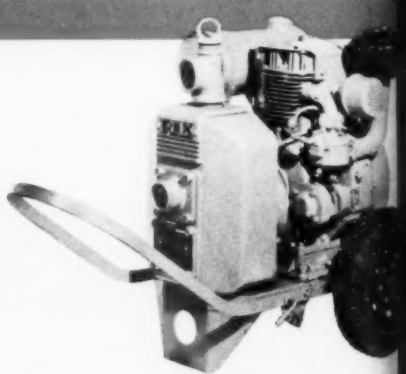

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of Boonesville, recovered free oil on a drill-stem test of the Bend conglomerate. Top of the Pennsylvanian had not been reported. Elevation was 981 ft. The test, from 5,050-76 ft., had gas in 38 minutes and recovered 150 ft. of high-gravity oil, plus 100 ft. of heavily oil and gas-cut drilling fluid. Surface flowing pressure was 50 psi. Shut-in bottom-hole pressure was 1,475 psi. in 15 minutes. Operators were to drill ahead before making another test.

NORTH TEXAS (DISTRICTS 9 AND 7-B) SUCCESSFUL WILDCATS

Callahan County: S. C. Herring 1 J. W. Booth, Sec. 3,193, TE&L Sur., 7 mi. NE Putnam, TD 3,254 ft., elev. 1,483 ft., Caddo 3,191 ft., pay 3,204 ft., perf. 3,204-17 ft., flowed 28 bbl. 40°-gravity oil in 3 hours., open 2-in., SIP 1,170 psi.

S. C. Herring 1 Rosa McCollum, Sec. 3,162, TE&L Sur., 7 mi. NE Putnam, TD 4,147 ft., PB 1,808 ft., elev. 1,511 ft., Strawn 1,745 ft., Caddo 3,178 ft., Ellenburger 4,057 ft., perf. 1,719-23 ft., pumped 20 bbl. oil and 20 bbl. water a day.

Clay County: Ted Weiner 1 F. L. Brown, Blk. 2, Hopkins CSL, A-176, ⅛ mi. SE Bluegrove, TD 4,721 ft., elev. 1,015 ft., Strawn sand 4,667-70 ft., pumped 170.34 bbl. 44°-gravity oil a day, GOR 100 cu. ft.

Stonewall County: Roark, Hooker & A. G. Hill 1 C. L. Williams, 467 ft. out of SW corner 6-C-AB&M Sur., 8 mi. NE Aspermont, TD 5,886 ft. in shale, elev. 1,612 ft., Caddo 5,745 ft., conglomerate 5,875 ft., 7-in. casing 5,873 ft., flowed 803.73 bbl. 40°-gravity oil in 20 hr., 32/64-in. choke, GOR 736 cu. ft., CP 500 psi., TP 275 psi.

NORTH TEXAS (DISTRICTS 9 AND 7-B) WILDCAT FAILURES

Callahan County: McElroy Ranch Co. 1 Emma Cottle, Sec. 2,048, TE&L Sur., 8 mi. N Putnam, dry, TD 3,342 ft., elev. 1,496 ft.

Coleman County: H. C. Lessenger 1 Grady McIver, Joseph S. Martin Sur. 221, 2 mi. SW Trickham, dry, TD 1,028 ft. in shale, Breckenridge sand 1,006 ft.

Comanche County: Amburgey & Estes 1 R. L. Weaver, Sec. 3, HT&B Sur., A-510, ¾ mi. W Sidney, dry, TD 2,955 ft., elev. 1,460 ft., Marble Falls 2,211 ft., Barnhart 2,490 ft., Ellenburger 2,685 ft.

Cooke County: Walter L. Plemons Production Co. 1 D. L. Akin, J. H. Broadnax Sur., A-104, mi. NE Leo, dry, TD 2,566 ft.

Jack County: Mid-Continent Petroleum Corp. 1 John W. Campbell "A," SFIW Sur., A-555, 7 mi. S Post Oak, dry, TD 5,999 ft., Ellenburger 5,990 ft.

Knox County: J. W. Baldwin 1 Buster Coffman, 83-45-H&TC, ½ mi. S Goree, dry, TD 1,733 ft.

Shackelford County: R. C. Foster and T. I. Foster 1 Bud Martin, Sec. 40, BAL Sur., 5 mi. S Albany, dry, TD 599 ft. in shale.

Stephens County: V. C. Winton 1 J. S. Knott, 54-4 T&P, 3 mi. SE Caddo, dry, TD 2,272 ft., sand with oil and gas show 2,248-50 ft.

Stonewall County: Moutray-Moore Drilling Co. 1 W. J. Bryan, Sec. 11, Austin & Williams Sur. 348, 7 mi. N Hamlin, dry, TD 3,710 ft., elev. 1,730 ft., DST 3,632-43 ft. recovered oil and salt water.

S. B. Roberts 1 Fay Yount Morton (rerun for correction, previously reported in Fisher County), Sec. 22, Austin & Williams Sur. 349, 5 mi. NW Hamlin, dry, TD 5,214 ft., elev. 1,770 ft., Flippen 3,118 ft., Swastika 3,707 ft., King 3,544 ft., Canyon sand 4,458 ft.

Taylor County: Drilling & Exploration Co. and Sojourner Drilling Co. 1 S. G. Tipton "A," 9-18-T&P, 1 mi. SW Merkel, dry, TD 3,400 ft., elev. 1,893 ft., Saddle Creek lime 2,636 ft., Flippen 2,681 ft., Hope 2,822 ft., reef 3,365 ft.

Louisiana-Arkansas

Casing Set on La Salle Parish Wilcox Discovery

SHREVEPORT.—Hunt Oil Co. 25 Louisiana Delta Hardwood Lumber Co., prospective Wilcox sand well 1 mile north of Saline Lake field, La Salle Parish, had total depth of 6,005 ft., still in the Wilcox topped at 3,845 ft. Electric surveys had been run and 7-in. casing set at 5,537 ft.

Last week the well flowed oil in 9 minutes, on a drill-stem test at 5,495-5,505 ft. It was cored ahead from 5,505-25 ft., recovering 3 ft. of fine-grained porous sand with oil shows, and 17 ft. of shaly sand with no shows. According to the electric log, there was another oil sand from 5,479-94 ft.

In Caddo Parish, J. D. Collins 1 Caplis, 33-16n-12w, 5,500-ft. wildcat, was drilling below 4,005 ft. in shale. Further shows, beyond the gas blowout at 2,855 ft., had not been reported.

Continental Oil Co. 1 Wideman, 21-21n-7w, Claiborne Parish, was drilling shale at 7,358 ft. Field sources indicated it would be carried into the Smackover.

Stanolind Oil & Gas Co. 1 G. W. Meadors, 8-22n-5w, was drilling Cotton Valley sand and shale at 10,084 ft. following a drill-stem test from 9,776-9,802 ft. Using ¼-in. chokes and 3,300 ft. of water cushion, the 1-hour test recovered the water cushion and 30 ft. of mud with no shows.

Carnes & May 1 Clark, Paluxy wildcat 10 miles southwest of Delhi field, in 7-15n-8e, Franklin Parish, was drilling shale at 3,756 ft.

Southwest Gas Producing Co. 1 Josie M. Colvin, SE NW 5-19n-2w, completed as the seecond well in Unionville field. Total

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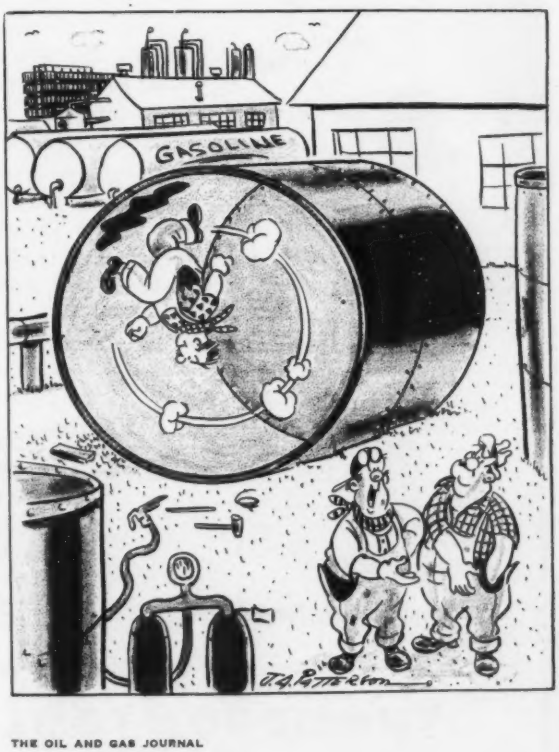

THE OIL AND GAS JOURNAL

"I knew he could do it—pay off!"

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depth was 9,077 ft. and perforations were in the Vaughn section of the Cotton Valley, from 8,840-56 ft. The well was cleaned into pits through various size chokes, and was estimated good for 50,000,000 cu. ft. of gas daily, open flow, plus 40 bbl. of distillate per 1,000,000 cu. ft. Flowing tubing pressure was 2,800 psi.

Oklahoma

Ringwood Maremac Zone Extended 4 Miles West

MAZDA OIL CORP. added a 4-mile west extension to the productive limits of the newly discovered Maremac reservoir in the Ringwood pool, Major County. Its 1 Scannell, NE NE NE 3-21n-11w, flowed 45 bbl. of oil in 24 hours after acid treatment with 5,000 gal. opposite casing perforations from 7,200-50 ft. and 7,250-75 ft. Originally, the well was drilled to a total depth of 7,400 ft. in Maremac lime topped at 7,197 ft. (—5,911 ft.). On last report, operators were preparing to test separately the Manning zone which had indicated production from 6,918-81 ft.

Pawnee County is getting a new oil pool in the area about 6 miles north of the town of Perry where R. L. Heltzman is completing his 1 Wolfe, SE SE SW 30-23n-5e, flowing 100 bbl. of clean oil per day through ¼-in. choke. Production is from Oswego lime at 2,936-33 ft. Nearest production is in the Masham area about 3 miles to the northwest.

Production of the Sac-Fox pool in Lincoln County is being extended about ¾ mile to the west and north where Zephyr Petroleum Co. and Alpha Petroleum Co. appear to have a Prue sand well in their 1 Criess, NW SE SW 2-14n-6e. The well showed considerable gas and flowed oil at the rate of about 20 bbl. per day. Bottom of the hole is 2,960 ft. with top of the sand at 2,932 ft. Sand was exposed by removal of an alloy section making up the bottom 60 ft. of the casing string, which had been cemented to total depth.

J. A. Roberson 1 Pope, C W½ SW NE 34-1n-9e, gas-distillate discovery well in the area 8 miles west of Coalgate, Coal County, flowed 2,444,000 cu. ft. of gas and 48 bbl. of 58° distillate through ⅝-in. choke in a 6-hour potential test. It has a calculated open flow capacity of 27,990,000 cu. ft. of gas, with 15.4 bbl. of distillate per 1,000,000 cu. ft. of gas. Flowing pressure on the tubing during the test was 2,748 psi. With the well shut in, pressure built up to 2,844 psi. Production is from McLish sand with casing perforated at 7,173-80 ft.

Ned Biffle 1 Stuart, NE NE SW 13-3n-1e, an outpost well on the west side of the East Pauls Valley pool, Garvin County, has been completed flowing 6,000,000 cu. ft. of gas daily through ½-in. choke. Total depth is 3,873 ft. with casing cemented at 3,863 ft., perforated in Oil Creek sand at 3,849-51 ft.

OKLAHOMA SUCCESSFUL WILDCATS

Creek County: New pay in Mannford district—Woods-Gilchrist Oil Co. 1 Woody, SW SE SE 2-18n-8e, elev. 843 ft., flowed 184 bbl. of 38°-gravity oil per day from Red Fork at 2,452-67 ft., TD; Checkerboard 1,510 ft., Oswego 2,056 ft., coal 2,118 ft., Prue 2,122 ft., Verdigris 2,193 ft., Skinner 2,216 ft., second Skinner 2,273 ft., third Skinner 2,327 ft., lime 2,400 ft., Red Fork 2,448 ft.

Cushing ¾ mi. N extension—Thompson Drilling 1 Landrum, NE SW NE 29-19n-7e, pumped 1 bbl. of oil from Red Fork at 2,767-69 ft., TD 3,005 ft., Inola 2,845 ft., Bartlesville 2,910 ft., old well worked over.

OKLAHOMA WILDCAT FAILURES

Cotton County: W. T. Jones and Loffland Bros. 1 Coos-se-woon, NW SW SW 12-4s-11w, dry, TD 1,671 ft., sandy shale 1,334 ft.

Creek County: L. B. Jackson 1 Atkins, NW NW NE 2-17n-9e, ½ mi. S of SE Mannford, elev. 788 ft., dry, TD 3,100 ft., Hogshooter 755 ft., Oswego 1,752 ft., Prue 1,828 ft., Verdigris 1,917 ft., Red Fork 2,208 ft., Inola 2,330 ft., Bartlesville 2,396 ft., Mississippi lime 2,706 ft., Woodford 3,106 ft., Simpson 3,054 ft., Wilcox 3,066 ft.

Garvin County: K. A. Ellison 1 Wells, NE NE NW 4-3n-3w, elev. 1,069 ft., dry, TD 7,883 ft., Checkerboard 7,070 ft., Gibson 7,542 ft., Gibson sand 7,702 ft. and 7,770 ft., sand 7,796 ft., Springer 7,830 ft.

Greer County: Cities Service 1 Kerbo, NW SW NW 15-4n-24w, elev. 1,792 ft., dry, TD 5,455 ft., Panhandle lime 2,380 ft., Arbuckle detrital 5,274 ft., Arbuckle 5,292 ft.

Jefferson County: Sun Drilling 1 Burnett, SE SW SW 33-5s-5w, elev. 892 ft., dry, TD 4,676 ft., Palo Pinto lime 2,440 ft., first Palo Pinto sand 2,475 ft., second Palo Pinto sand 2,526 ft., sand 3,704 ft. and 3,935 ft., hard lime 4,300 ft.

Kay County: Amerada and Wilcox 2 Graham, NW SW SE 21-27n-5e, ⅝ mi. SW Burbank, elev. 1,203 ft., dry, TD 3,255 ft., Pawhuska 1,087 ft., Hoover 1,320 ft., Avant 1,610 ft., Tonkawa 1,926 ft., Layton 2,540 ft., Checkerboard 2,680 ft., conglomerate 2,798 ft., Oswego 2,912 ft., Prue 3,044 ft., Skinner 3,114 ft., Mississippi lime 3,212 ft.

Kiowa County: Ace Oil Co. 2 Sheppard, SW SW NW 27-7n-16w, Gotebo district, dry, TD 475 ft., sand 440 ft.

Ace Oil Co. 3 Sheppard, SE SE NE 27-7n-16w, S Gotebo district, dry, TD 440 ft., sand 350 ft .and 438 ft.

H. B. Mummert, Jr., 1 School Land, NW NE SE 36-7n-17w, dry, TD 1,020 ft., sand 535 ft.

LeFlore County: O. N. Sellers et al. 1 Dr. Jones, C NW NE 25-3n-22e, dry, TD 5,005 ft., in Stanley shale.

Lincoln County: Clark & Cowden 1 Umpleby, SW SW SW 29-13n-3e, 3½ mi. SW

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Happy Hill, elev. 989 ft., dry, TD 5,597 ft., Pawhuska 1,590 ft., Belle City 3,052 ft., Hogshooter 3,417 ft., Checkerboard 3,758 ft., Oswego 4,435 ft., Verdigris 4,560 ft., Skinner 4,678 ft., Red Fork 4,732 ft., Hunton 5,280 ft., Sylvan 5,305 ft., Viola 5,406 ft., dolomite 5,460 ft., Wilcox 5,502 ft.

Flynn Oil Co. 1 Hull, NE NW NW 35-12n-3e, ½ mi. NW of SW Meeker, elev. est. 1,100 ft., dry, TD 5,648 ft., Hogshooter 3,270 ft., Checkerboard shale 3,594 ft., Checkerboard lime 3,619 ft., Oswego 4,350 ft., Prue 4,378 ft., Verdigris 4,474 ft., lower Skinner 4,534 ft., Red Fork 4,704 ft., Inola 4,808 ft., lime 4,907 ft., basal Pennsylvanian-Caney 5,015 ft., Mayes 5,060 ft., Woodford 5,256 ft., Sylvan 5,357 ft., Viola 5,453 ft., Wilcox 5,542 ft., second Wilcox 5,632 ft.

Seminole County: Wilcox 1 McIntosh, NE SE NW 11-11n-7e, 1¼ mi. S of new pool, elev. 895 ft., dry, TD 4,297 ft., Checkerboard 1,519 ft., Calvin 2,424 ft., Senora lime 2,803 ft., Senora sand 2,815 ft., Earlsboro 3,110 ft., Inola 3,277 ft., lime 3,480 ft., Booch 3,562 ft., Cromwell 3,777 ft., Mayes 4,105 ft., Woodford 4,242 ft., Hunton 4,270 ft.

Sequoyah County: V. A. Fisher and H. Williamson 1 Drake, NW SW SE 14-11n-23e, 15 mi. NW Cartersville, dry, TD 282 ft. in Bartlesville limy sand.

Stephens County: Pray & Morgan 1 Morrison, NE NE NE 9-2s-4w, elev. 1,127 ft., dry, TD 4,870 ft., Deese sand 4,126 ft., Sycamore lime 4,760 ft., Woodford 4,813 ft.

Vickers Petroleum 1 Ellsey, SW SE NE 3-2s-7w, elev. 1,104 ft., dry, TD 4,705 ft., Loco lime 2,995 ft., detrital 4,216 ft., Simpson shale 4,660 ft.

Tillman County: S. D. Johnson 1 Mansell, NE SW SW 31-2s-17w, elev. 1,210 ft., dry, TD 3,108 ft., Cisco sand 2,774 ft., Canyon 2,978 ft.

C. A. Beasley 1 Anderson, NW SE NE 34-2n-18w, dry, TD 985 ft.

Canadian Fields

Drill-Stem Test Indicates Gas-Condensate Discovery

CALGARY.—A condensate discovery is indicated by drill-stem test at the Chip Lake wildcat of Select Oils, Ltd. While no official data have been released, unofficial information indicates that natural gas in fairly substantial volume plus a small pipe recovery of about 70°-gravity condensate were obtained in two drill-stem tests. Source is reported as a sand formation.

The well, Select-Chip Lake 1, in LSD 4, 29-53-10w5, is about 75 miles west of Edmonton.

Last official report on the well was that it has reached a depth of 6,145 ft., and that testing was under way. Two drill-stem tests have been run, but the intervals were not reported. First test was said to have made around 80,000 cu. ft. of natural gas daily, plus a pipe recovery of 60 ft. condensate. Second test was reported to have yielded gas at the rate of 2 to 3 million cubic feet daily, with a recovery of 40 ft. of condensate.

Canadian Fina Oil, Ltd., has found some oil encouragement, in the form of slightly oil-cut mud in the Viking sand horizon, at its second wildcat venture in the Coronation-Bulwark area of Central Alberta. Initial drill-stem tests have been run in the Viking, and coring is now proceeding below 2,741 ft. with further testing in that sand dependent upon core results. The well, located about 6¾ miles east-southeast of Canadian Fina Bulwark 1 Viking oil discovery well, is scheduled to test the D-3 Devonian equivalent. Location is about 140 miles northeast of Calgary.

The interesting wildcat, Canadian Fina et al-Brownfield Province 1, in LSD 12, 16-38-11w4, topped the Viking sand at 2,705 ft., 297 ft. subsea. First drill-stem test, of interval 2,700-05 ft., gave pipe recovery of 15 ft. of slightly oil-cut mud in 54 minutes. Next test, from 2,700-34 ft., gave a recovery of 30 ft. of oil-cut mud with no water or gas flow.

Meanwhile, Fina-Bulwark Province 1, in LSD 3, 20-38-12w4, is continuing pump tests, with current yield about 30 to 32 bbl. daily. Experiments are being carried out at various stroke rates, and a better evaluation of the well should be possible soon. The well started on pump about 2 weeks ago, with initial rate about 36 bbl. daily.

Imperial Oil, Ltd., has found some oil and gas encouragement plus water in the upper part of D-2 zone of Devonian at its Imperial-Golden Spike 8 located about ½ mile east and the same distance north of production. The well is now deepening to test D-3 reef prospects. The D-3 might be found from 200 to 250 ft. below the base of D-2 zone interval already tested.

Golden Spike 8, in LSD 11, 26-51-27w4, ran 1-hour drill-stem test of interval 5,110-54 ft. and received a maximum natural gas rate of 112,000 cu. ft. daily plus a pipe recovery consisting of 810 ft. of oil, 90 ft. of oil-cut mud, and 300 ft. of salt water. Coring is now proceeding below 5,300 ft.

There were 25 more wells completed in Alberta during the past week, including 2 natural-gas discoveries, 17 oil wells, and 6 which failed to yield either oil or gas. Since the first of this year, Canadian and American oil companies have drilled and completed 542 wells in Alberta. During the 223-day period ended August 11 the score stood at: 410 oil wells, 22 gas wells, and 110 failures.

CANADIAN SUCCESSFUL WILDCATS

Cal-Standard-Stettler Province 11-18, LSD 11, 18-39-18w4, TD 5,817 ft., capped as Lower Cretaceous gas well.

Rio Bravo-Liebing 1, LSD 8, 24-38-18w4, TD 5,639 ft., IP 3,000 M.c.f. per day.

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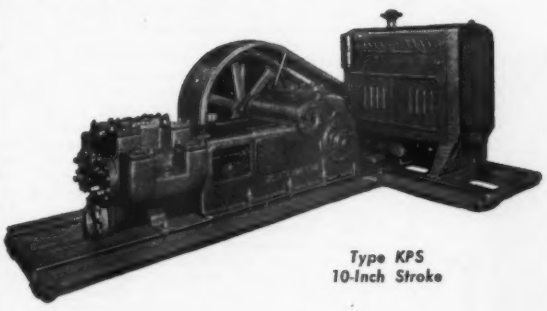

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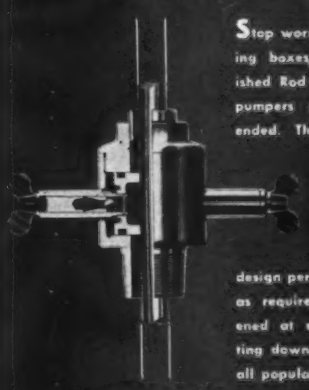

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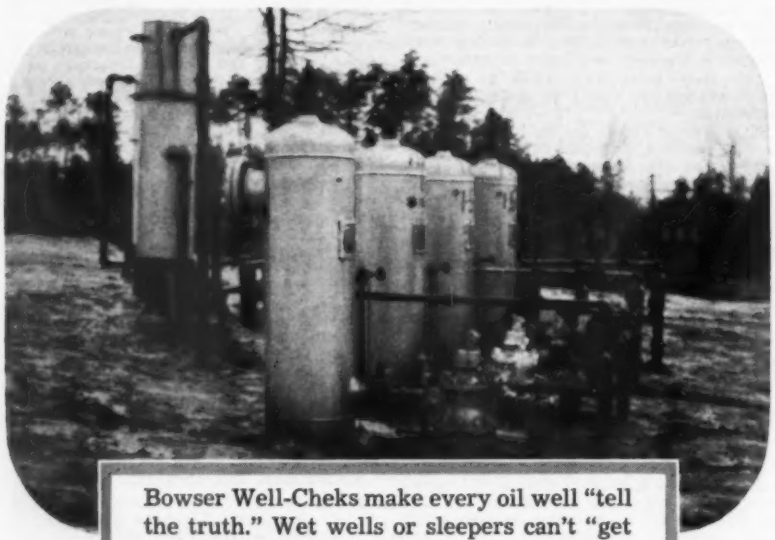

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CANADIAN WILDCAT FAILURES

Shell-Anglo-Black Diamond 1, LSD 12, 12-20-2w5, TD 11,826 ft.
Amcan-Bailey-Cator Creek 1, LSD 16, 20-38-14w4, TD 3,680 ft.
Socony-Delia 1, LSD 10, 25-32-18w4, TD 6,081 ft.
Imperial-Grouard 1, LSD 12, 16-75-15w5, TD 7,194 ft.
Model Concord 1, LSD 4, 3-39-20w4, TD 5,399 ft.

EASTERN CANADA

Bruce Peninsula.—In Ontario, Imperial Oil Co. has leased most of the acreage in the Cape Chin-Dyer's Bay area of the Bruce Peninsula and is carrying on survey work. Drilling will depend on the information revealed by the survey. Drilling in Bruce County, which lies between Lake Huron and Georgian Bay, has been undertaken several times. The most encouraging results were in the Hepworth area, where natural gas was encountered in the Trenton limestone around 1,450 ft. and was commercially utilized for a short time. The area is geologically related to Manitoulin Island, farther northwest, where oil approximating commercial production has been encountered at various times in the Trenton.

Illinois-Ind.-Ky.

Oil Production Proved in Goldengate Area Wildcat

TESTING is under way in Skiles Oil Corp. 1 Allison, SW SW NW 23-2s-9e, 2 miles southwest of Goldengate, southeastern Wayne County, Illinois, where opening of another good producing area seems assured. This well, located more than 2 miles from any other production, found excellent oil saturation in three zones, the Aux Vases at 3,217-34 ft., the O'Hara at 3,281-87 ft., and the Rosiclare at 3,307-12 ft.

The lower two zones, open through casing perforations, are being tested first. From them the well swabbed initially at an average rate of 10 bbl. of oil while cleaning. The Aux Vases zone to be tested later will be exposed by removal of an alloy section run in the casing string opposite that zone. Total depth of the hole is 3,317 ft.

F. J. Ellison has completed his 1 Woods, N½ SW NW NE 28-5n-7w, northeastern Knox County, Indiana, wildcat, to open the Westphalia pool. Producing from McClosky lime at 944-52 ft., the well flowed at the rate of 210 bbl. of oil and 5 bbl. of water per day. Nearest production is in the Plainville pool, about 3½ to 4 miles southeast in northwestern Daviess County. The latter pool, opened late in 1949, gets its main production from the same formation, found there at depths of from 750 to 800 ft.

Another new discovery well for Indiana is B-L-S Drilling Co. 1 Allison, E½ NE NW NW 35-2n-7w, southwestern Daviess County, which has been completed pumping 8 bbl. of oil with about 12 bbl. of water per day from McClosky lime at 1,056-64 ft. with bottom of the hole at 1,117 ft. The discovery is located about a mile west of production of the Cumback pool and has been designated as the Cumback West pool. The area is also about 2 miles southeast of the Veale pool.

Felmont Oil Corp. 1 Hayden, 13-N-26, which is opening a new pool in the area about 1½ miles east of Beach Grove, McLean County, western Kentucky, swabbed at the rate of 25 bbl. of oil per day natural in starting tests of Waltersburg sand at 1,680-1,700 ft. The zone will be given a 60-qt. shot in an attempt to improve production. Previously tested was the Tar Springs sand at 1,758-71 ft., which showed for production. Remaining to be tested are two Pennsylvanian sand zones at 979-94 ft. and 1,030-60 ft. An alloy section is in the casing string opposite the latter zones. Nearest

other production is in the Wyman pool 2 miles to the northeast.

A new pay zone, the Salem lime, for the Lyles area in western Gibson County, Indiana, has been opened by T & H Corp. at its 1 Deep Vein Coal, SW SE NW 1-2s-12w. Casing opposite the Salem section was perforated at 2,772-43 ft. The well pumped 20 bbl. of oil and 3 bbl. of water per day. Bottom of the hole is 2,802 ft. with casing at 2,776 ft.

ILLINOIS SUCCESSFUL WILDCATS

Gallatin County: A. Valters 1 Drone, NE NE NE 27-8s-9e, IP 35 bbl., Cypress 2,474-86 ft., TD 2,494 ft. (1 mile from Inman production).

Wayne County: National Associated Petroleum Co. 1-A Richardson, NE NE NE 22-1n-5e, IP 27 bbl., Aux Vases 2,879-86 ft., TD 2,896 ft.

ILLINOIS WILDCAT FAILURES

Clark County: F. B. Cline 1 Wilson, SE SE NE 27-12n-12w, dry, TD 2,311 ft.

Edwards County: John Buchman 1 Fieber Community, NE NE NW 7-3s-14w, dry, TD 3,159 ft.

Fayette County: H. R. Lippett 1 McClain, SW SE NW 33-7n-3e, dry, TD 1,910 ft.

Franklin County: Nation Oil Co. 1-A Kirley, SE SE SE 23-7s-3e, dry, TD 3,187 ft.

Hamilton County: E. H. Kaufman 1 Humgate, SE NW SW 10-6s-5e, dry, TD 3,414 ft.

Jasper County: Robinson & Puckett 1 Wagner, SE SE NE 19-5n-11e, dry, TD 3,029 ft.

Lawrence County: George & Wrather 1 Wolf et al., NE NE NW 30-2n-13w, dry, TD 2,992 ft.

Macoupin County: Lewis Bourgeois 1 Volino, NW NW SW 16-10n-7w, dry, TD 550 ft.

Perry County: G. C. Schoonmaker 1 Geistroerfer, NE NW SW 23-4s-3w, dry, TD 1,691 ft.

Richland County: T. B. Dirickson 1 Berry, NW SE SW 21-3n-10e, dry, TD 3,225 ft.

Sun Drilling Co. et al. 1 Scherer, NW NW NE 17-4n-10e, dry, TD 3,600 ft.

S. R. Stocker 1 Leathers, SE NW SE 27-3n-14w, dry, TD 3,218 ft.

Schuyler County: W. C. McBride 1 Loring, C E½ NW NE 15-2n-2w 4th P.M., dry, TD 975 ft.

St. Clair County: Barron Kidd 1 Frailey, NE SW SW 8-2n-7w, dry, TD 2,349 ft

White County: Nash Redwine 1 Williams SW SW NW 34-5s-9e, dry, TD 3,367 ft.

INDIANA SUCCESSFUL WILDCATS

Daviess County: B-L-S Drilling Co. 1 Allison, E½ NE NW NW 35-2n-7w, IP 8 bbl., McClosky 1,056-64 ft., TD 1,117 ft. (discovery well Cumback West pool).

Gibson County: T & H Corp. 1 Deep Vein Coal, SW SE NW 1-2s-12w, IP 20 bbl., Salem 2,720-44 ft., TD 2,802 ft. (opens new pay zone, Lyles pool).

Knox County: F. J. Ellison 1 Woods, N½ SW NW NE 28-5n-7w, IP 210 bbl., McClosky 944-52 ft., TD 953 ft. (discovery well Westphalia pool).

H & V Oil Co. et al. 1 Kensler-Druman, NE SW SW SE 35-3n-9w, IP 70 bbl., Aux Vases sand 1,468-70 ft., TD 1,470 ft. (discovery well Monroe City North pool).

INDIANA WILDCAT FAILURES

Clay County: Carter Oil Co. PG-8, SW SW SW 5-13n-6w, dry, TD 1,408 ft.

Carter Oil Co. PG-5, NW NW NW SW 10-13n-7w, dry, TD 1,363 ft.

Dubois County: B-L-S Drilling Co. 1 Scherle, SE NW NW 4-2s-5w, dry, TD 886 ft.

National Associated Petroleum Co. 1 Blimker, NW SW SE 27-2s-5w, dry, TD 1,024 ft.

Gibson County: Skiles Oil Corp. 1 Beloat, NW NW SW 16-3s-10w, dry, TD 2,193 ft.

Parke County: Carter Oil Co. PG-6, NW SW SW 34-16n-8w, dry, TD 1,290 ft.

Carter Oil Co. PG-7, NE NE NW NW 34-14n-7w, dry, TD 1,442 ft.

Pike County: Aberdeen Petroleum Co. 1 Willis, NE NW SW 7-1s-8w, dry, TD 3,141 ft.

Posey County: George S. Engle and Slagter Production Co. 1 Crombach, NE NE NW 6-8s-14w, dry, TD 2,130 ft.

Spencer County: Ted Lindsay 1 Wilmes, SW SW NE 6-4s-4w, dry, TD 987 ft.

WESTERN KENTUCKY SUCCESSFUL WILDCAT

Union County: Delta Drilling Co. 1 Uniontown Bank, S½ NE SE SW 8-P-20, IP 80 bbl., Lower O'Hara 2,501-14 ft., TD 2,626 ft. (extension Caney Mound pool).

WESTERN KENTUCKY WILDCAT FAILURES

Henderson County: Skiles Oil Corp. 1 Alves, NW NW SW SE 18-Q-21, dry, TD 2,718 ft.

Kingwood Oil Co. 1 Krohwinkel, N½ SW NE NW 25-Q-27, dry, 2,013 ft.

EASTERN KENTUCKY

ASHLAND.—A rank wildcat for Breathitt County was nearing the crucial depth as of first of the week. The test, Bedrock Petroleum Co. 1 Mintie Sue Lindsey on Hunting Creek in north-central portion of county topped prospective Big Six (Silurian) sand at 2,087 ft. and was drilling at 2,090 ft. with only slight show of oil and gas. Successful completion would open up large new area for exploration.

In northeastern Estill County and on eastern end of Furnace (Deep) gas pool, Jack Kindred et al., have abandoned 2 George Lyle at total depth of 2,705 ft. after failing to make a commercial well in the St. Peter sand at that depth. Earlier tests indicated a producer but subsequent testing proved disappointing.

Ohio Fields

Two Clinton Sand Wells Appear Unusually Good

COLUMBUS.—Jay Hunt et al., have drilled in what will probably be the largest oil well completed this year, on Samuel Cooperider, Section 3, Bowling Green Township, Licking County, in Brownsville pool. Clinton sand at 2,949-90 ft. made 85 bbl. natural and will be shot. A location to the north, W. C. Adair et al., 4 William Bratton, Lot 24, Hopewell Township, also is showing up as an unusually good well. Clinton at 2,924-58 ft. made 80 bbl. natural and will be shot.

Frank Brendel Oil & Gas Co. 4 Jared Ashcraft, Section 7, Jackson Township, Muskingum County, had a good oil showing natural in Clinton at 3,154-3,218 ft. which made 100 bbl. in 24 hours after shot. Four wells are currently drilling in this pool.

Two wildcats in addition to the four now drilling have been started in the Sandyville-Akron area. Ed Obermiller et al., are drilling on the Charles Bodemer farm in Lot 8, Springfield Township, Summit County, and M. B. Belden Co. has a rig up on the G. B. Walters farm in Section 25, Tuscarawas Township, Stark County.

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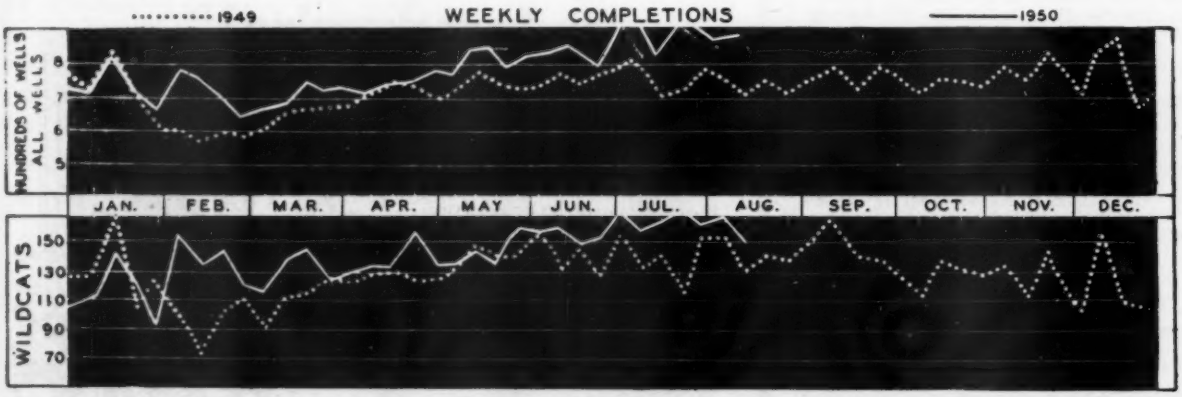
CURRENT STATISTICS

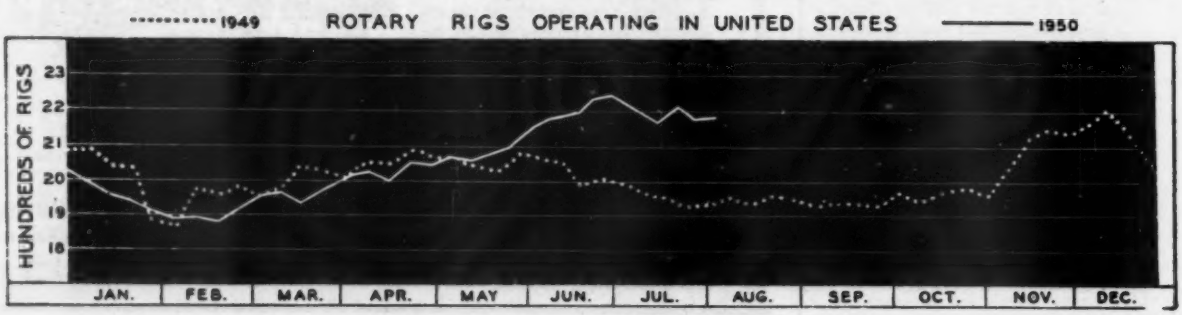
EXPLORATION

WEEKLY WELL COMPLETIONS . . . WEEK ENDED AUGUST 12, 1950

	Total of all wells					Aug. 12		Wildcat completions and discoveries					Cumulative total, 1950				
	Comp.	Oil	Gas	Dry	Footage	1950	1949	Oil	Dist.	Gas	Dry	Total	Oil	Dist.	Gas	Dry	Total
New York	11	6	0	*5	13,180	396	676	0	0	0	0	0	0	0	0	0	0
Pennsylvania	17	9	1	†7	31,977	821	1,061	0	0	0	0	0	0	0	1	2	3
West Virginia	9	2	6	1	29,641	397	303	0	0	1	1	2	0	0	12	15	27
Ohio	13	7	2	4	25,086	600	673	0	0	0	0	0	1	0	2	7	10
Indiana	51	20	2	29	84,520	991	802	4	0	0	10	14	33	0	1	173	207
Kentucky	35	14	10	11	65,659	670	553	1	0	0	2	3	16	0	1	51	68
Illinois	69	27	1	‡41	152,667	1,586	1,508	2	0	0	15	17	32	0	1	366	399
Michigan	18	5	0	§13	40,803	519	595	0	0	0	8	8	19	0	4	174	197
Kansas	70	28	23	§19	256,006	2,277	1,963	2	0	1	11	14	59	0	7	357	423
Nebraska	7	3	1	3	32,502	64	19	0	0	0	3	3	4	0	1	30	35
Oklahoma	112	61	9	‡42	417,312	3,314	2,657	2	0	0	18	20	99	6	11	407	523
Texas	311	224	6	81	1,310,934	9,961	8,350	11	0	1	30	42	309	25	69	1,552	1,955
North Central (Dist. 7-B & 9)	85	46	0	39	213,090	3,046	2,744	4	0	0	10	14	184	2	18	607	761
West (Dist. 7-C & 8)	111	101	1	9	529,818	2,976	1,982	3	0	0	7	10	64	2	2	297	365
Panhandle (Dist. 10)	15	10	3	2	45,280	569	616	0	0	0	0	0	1	0	2	12	15
Eastern (Dist. 5, 6, & 6-P)	23	14	1	8	118,248	713	516	0	0	1	4	5	8	4	2	125	139
Gulf Coast (Dist. 2 & 3)	38	23	1	14	213,470	1,389	1,241	4	0	0	4	8	53	10	25	218	306
Southwest (Dist. 1 & 4)	39	30	0	9	191,028	1,268	1,251	0	0	0	5	5	49	7	20	293	369
Louisiana	58	38	5	15	297,968	1,487	1,361	2	0	0	4	6	31	13	4	121	169
Northern	36	24	3	9	112,706	786	754	0	0	0	1	1	4	2	1	53	60
Southern	22	14	2	6	185,262	701	607	2	0	0	3	5	27	11	3	68	109
Arkansas	9	4	0	5	36,001	248	198	0	0	0	4	4	5	0	0	61	66
Mississippi	4	1	0	3	29,646	198	213	0	0	0	2	2	8	2	0	71	81
Southeastern States	2	0	0	2	6,783	40	31	0	0	0	0	0	1	0	1	23	25
Montana	0	0	0	0	0	108	156	0	0	0	0	0	1	0	0	18	19
Wyoming	15	7	0	8	63,729	341	363	0	0	0	2	2	12	0	0	44	56
Colorado-Utah	2	1	0	1	10,013	45	79	0	0	0	0	0	2	0	0	30	32
New Mexico	20	10	4	6	102,659	384	323	0	0	0	3	3	10	1	0	34	45
California	44	33	0	11	163,735	1,073	1,614	1	0	0	9	10	15	0	2	227	244
Miscellaneous	0	0	0	0	0	34	15	0	0	0	0	0	0	0	0	9	9
Total United States	877	500	70	307	3,170,821	25,554	23,513	25	0	3	122	150	657	47	117	3,772	4,593
Total previous week	866	464	54	348	3,191,241	....	....	25	4	2	138	169	632	47	114	3,650	4,443
Total August 12, 1949	713	411	50	252	2,370,931	....	....	37	1	1	92	131	593	56	121	3,358	4,128

Service wells included: *5, †6, ‡1, §2.





DAILY AVERAGE PRODUCTION FOR WEEK

	Aug. 12 crude oil	B. of M. Aug. demand	Aug. 5 crude oil
Alabama	1,900	1,600	1,750
Arkansas	81,900	90,000	81,450
California	886,200	905,000	885,500
Colorado	61,900	67,000	59,600
Eastern	63,000	64,000	63,000
Florida	1,675	1,400	1,650
Illinois	172,600	186,000	177,400
Indiana	31,600	31,000	31,200
Kansas	293,600	298,000	309,300
Kentucky	27,700	30,000	28,100
Louisiana	574,800	578,000	571,475
North Louisiana	116,250	.....	116,700
South Louisiana	458,550	.....	454,775
Michigan	43,700	47,000	47,200
Mississippi	106,250	113,000	107,450
Montana	22,900	24,000	22,900
Nebraska	2,500	3,000	2,450
New Mexico	135,575	150,000	134,725
Oklahoma	464,100	455,000	456,200
Texas	2,463,950	2,240,000	2,425,650
Dist. 1 (Southwest)	29,400	.....	29,425
Dist. 2 (Southwest)	140,425	.....	139,975
Dist. 4 (Southwest)	222,400	.....	221,150
Dist. 3 (Gulf Coast)	432,450	.....	420,350
Dist. 5 (Eastern)	41,050	.....	39,650
Dist. 6 (Eastern)	97,650	.....	96,500
East Texas field	274,800	.....	274,975
Dist. 7-C (West)	61,350	.....	60,325
Dist. 8 (West)	846,100	.....	825,150
Dist. 7-B (W. Central)	72,325	.....	72,250
Dist. 9 (N. Central)	154,000	.....	153,750
Dist. 10 (Panhandle)	92,000	.....	92,150
Utah	3,600	4,000	3,600
Wyoming	156,100	162,000	157,800
Total United States	*5,595,550	5,450,000	5,568,400
Change from previous week, up	27,150		
Canada	81,565	.....	83,460

Total U. S. production January 1-August 12 .... †1,155,665,455 bbl.
Same period last year (crude plus cond.) ..... 1,143,009,835 bbl.

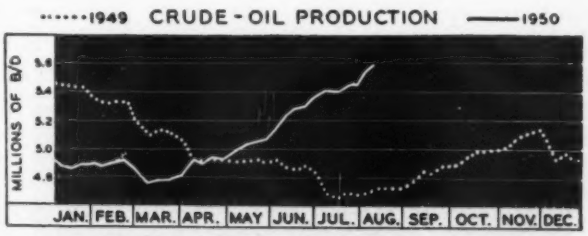
*Not including 95,935 bbl. condensate. †Including 21,811,755 bbl. condensate.

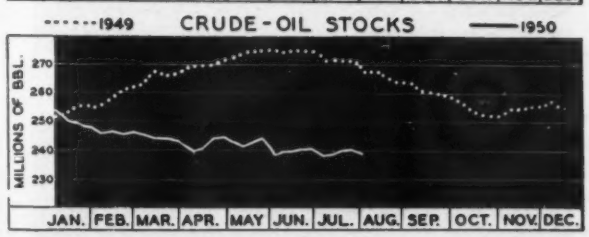
CRUDE-OIL STOCKS BY STATES OF ORIGIN*

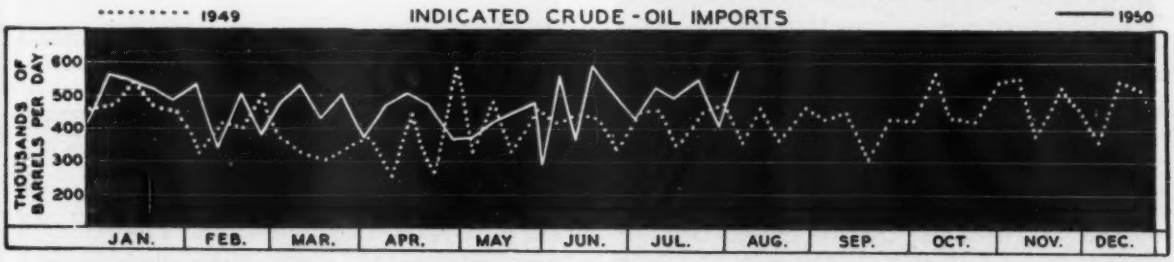
(Thousands of barrels)

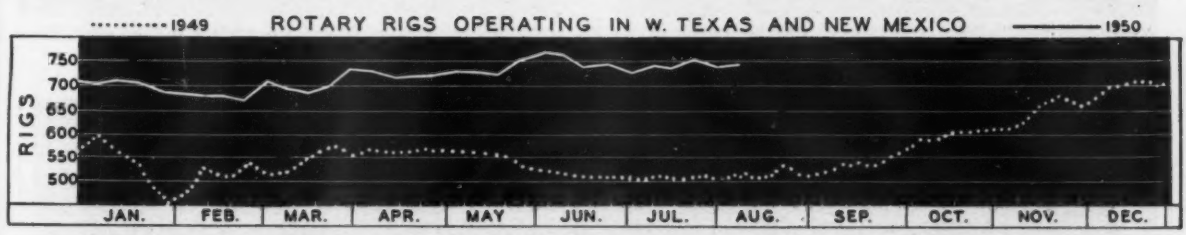
	Aug. 5, 1950	July 29, 1950	Aug. 6, 1949
Pennsylvania Grade	2,769	2,775	3,303
Other Appalachian	1,416	1,581	2,225
Illinois, Indiana, Michigan	9,232	9,429	14,548
Arkansas	2,805	2,758	2,914
Louisiana	14,522	14,885	15,182
North	3,230	3,489	3,671
Gulf	11,292	11,396	11,511
Mississippi	2,191	2,275	3,092
New Mexico	6,060	5,863	7,474
Oklahoma and Kansas	32,961	32,994	39,042
Texas	113,604	115,156	122,465
East Texas	15,498	15,658	16,295
West Texas	42,659	43,484	49,105
Texas Gulf	26,878	27,213	28,895
Other Texas	28,569	28,801	28,170
Rocky Mountain	12,094	11,861	14,110
California	34,277	34,476	35,733
Foreign	6,881	6,183	7,626
Total	238,812	240,236	267,714

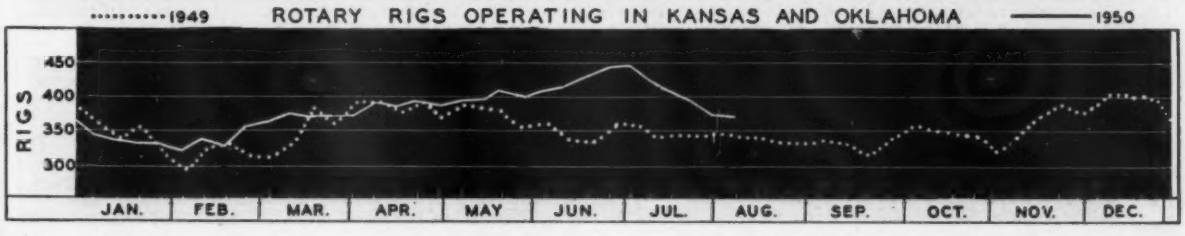
*Bureau of Mines.











XUM

A.P.I. REFINERY REPORT, AUGUST 5

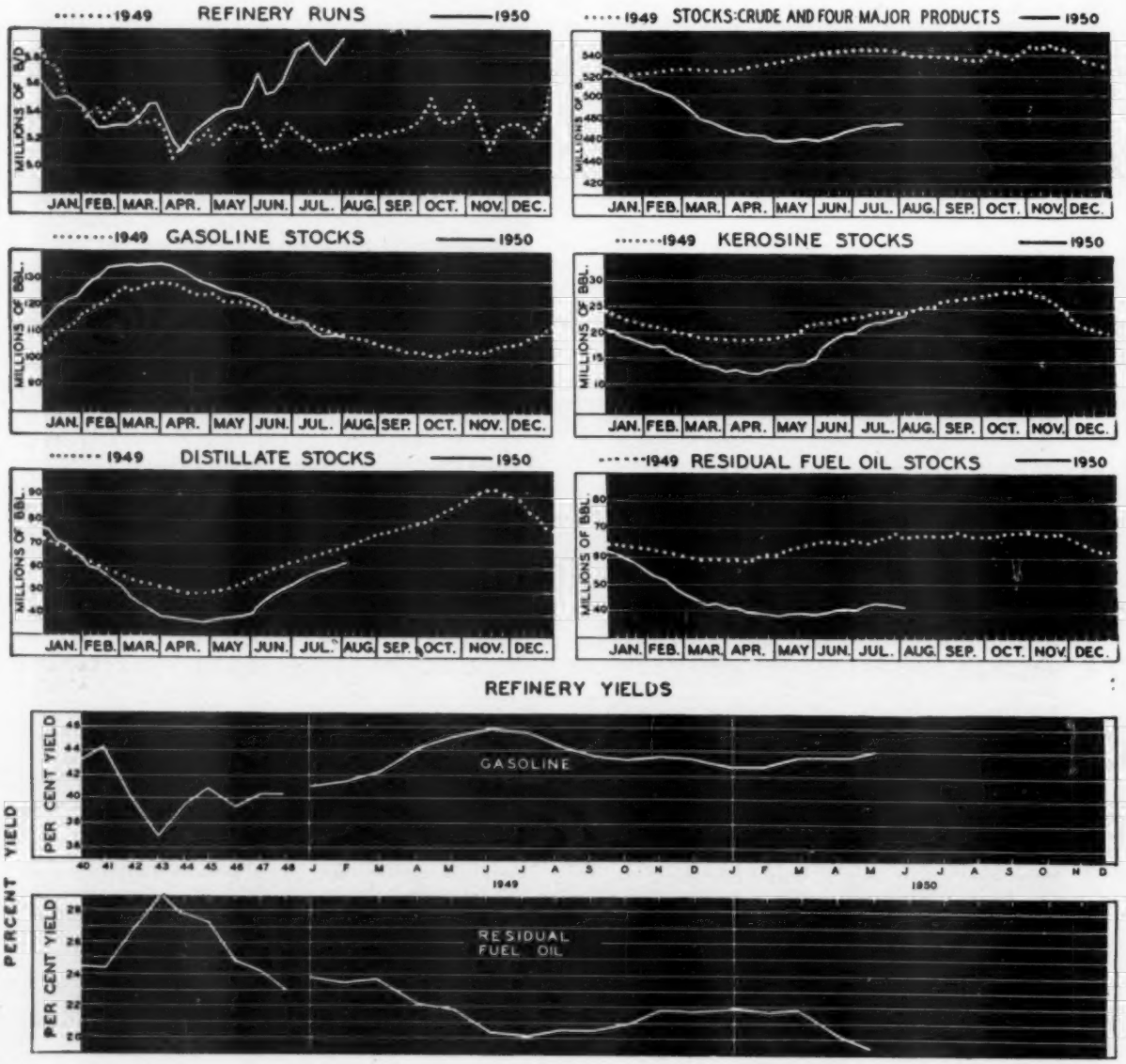
(Thousands of barrels)

District—	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual	Stocks at refineries, bulk terminals, in transit and in pipe lines: Gasoline†	Kerosine	Distillate‡	Residual
East Coast	986	375.4	29.1	183.7	211.2	25,804	7,521	15,251	10,310
Appalachian:									
District 1	91	42.6	2.9	15.1	9.3	2,359	392	667	412
District 2	64	29.4	3.0	6.6	13.3	967	140	174	231
Ind., Ill., Ky.	1,130	580.7	74.1	174.9	164.6	22,116	4,898	10,271	4,412
Okla., Kans., Mo.	508	290.3	7.6	113.4	59.1	10,878	1,306	5,984	1,282
Inland Texas	215	145.0	11.0	33.1	38.9	3,170	638	1,338	802
Texas Gulf Coast	1,321	599.7	96.6	288.4	236.4	16,013	4,352	10,148	4,861
La. Gulf Coast	486	227.4	52.3	81.1	52.7	5,761	2,545	3,261	1,810
N. La. and Ark.	67	27.4	6.1	12.3	12.4	2,529	440	766	284
Rocky Mountain:									
New Mexico	13	7.3	0.4	2.0	2.9	98	25	72	32
Other Rocky Mtn.	202	84.0	3.7	37.9	36.3	3,863	443	1,715	859
California	861	416.9	6.7	111.4	317.0	15,337	860	12,910	16,496
Aug. 5, 1950	5,944	2,826.1	293.5	1,059.9	1,154.1	108,895	23,560	62,557	41,791
July 29, 1950	5,870	2,854.4	327.6	1,038.0	1,124.3	‡109,206	23,352	61,137	42,253
Aug. 6, 1949	5,188	2,557.1	237.6	895.6	1,031.4	108,444	24,885	72,222	67,281

Bureau of Mines, August 1949

	Daily avg. crude runs	Daily average production: Gasoline*	Kerosine	Distillate	Residual
	746	317.5	26.6	168.2	182.0
	84	39.7	4.2	10.6	9.2
	63	34.8	3.9	4.5	11.5
	882	486.6	45.0	120.1	118.0
	430	242.8	15.2	81.6	60.5
	218	144.7	7.1	29.2	43.0
	1,252	607.8	68.9	222.2	232.0
	426	222.8	40.1	110.0	49.0
	78	32.1	6.2	12.4	15.5
	12	6.9	0.1	2.3	3.1
	183	81.1	4.8	31.8	37.1
	867	376.4	9.3	109.4	317.0
	5,241	2,593.2	231.4	902.3	1,077.9

*At refineries including natural blended. †Finished and unfinished. ‡Revised in East Coast.


1949 REFINERY RUNS 1950
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1949 KEROSINE STOCKS 1950
MILLIONS OF BBL.
1949 DISTILLATE STOCKS 1950
MILLIONS OF BBL.
1949 RESIDUAL FUEL OIL STOCKS 1950
MILLIONS OF BBL.
JAN. FEB. MAR. APR. MAY JUN. JUL. AUG. SEP. OCT. NOV. DEC.

CRUDE PRICES

GRAVITY SCHEDULE

Gravity—	Signal Hill, Calif.	Okla-homa, Kansas	Gulf Coast Tex.*	West Tex.†
18-18.9	$1.69	....	....	....
19-19.9	1.77	....	....	....
20-20.9	1.85	$2.25	....	$2.12
21-21.9	1.93	2.27	....	2.14
22-22.9	2.00	2.29	....	2.16
23-23.9	2.08	2.31	....	2.18
24-24.9	2.15	2.33	$2.56	2.20
25-25.9	2.23	2.35	2.58	2.22
26-26.9	2.31	2.37	2.60	2.24
27-27.9	2.37	2.39	2.62	2.26
28-28.9	2.42	2.41	2.64	2.28
29-29.9	2.48	2.43	2.66	2.30
30-30.9	2.54	2.45	2.68	2.32
31-31.9	2.59	2.47	2.70	2.34
32-32.9	2.64	2.49	2.72	2.36
33-33.9	....	2.51	2.74	2.38
34-34.9	....	2.53	2.76	2.40
35-35.9	....	2.55	2.78	2.42
36-36.9	....	2.57	2.80	2.44
37-37.9	....	2.59	2.82	2.46
38-38.9	....	2.61	2.84	2.48
39-39.9	....	2.63	2.86	2.50
40 and above	....	2.65	2.88	2.52

*For crude from Daboval, El Campo, and Sand Point.

†Includes Lea County, New Mexico. Last general price change represented a 50-cent increase becoming effective December 6, 1947.

FLAT CRUDE PRICES

Representative posted schedules per barrel.

East Texas†	$2.65
Kettleman Hills, California*	2.77
Beauregard Parish	2.60
Illinois Basin	2.77
Pecos County, Texas (Yates)	2.35
Bradford, Pennsylvania	3.89
Eastern Ill. and Western Ind.†	2.77
Tomball, Texas Gulf Coast	2.83

*37°-37.9°, †35° and above.

PETROLEUM-PRODUCT prices are stronger in all market areas with the one possible exception of gasoline on Gulf-East Coast markets.

For some time heating distillates have been hard to find on the Gulf Coast spot market. Some of the posted prices, admittedly low, were for delivery to regular customers only. Spot material below 7.25 cents a gallon vanished in July, and recent general quotations have been 7.375-7.5 cents a gallon. Further increases in Gulf-East Coast tanker rates have made it unprofitable to buy at Gulf Coast spot prices and sell at New York Harbor postings.

East Coast distillate prices now appear to be headed toward stabilization at a higher level. Cities Service Oil Co. announced an increase of 0.5 cent a gallon for No. 2 fuel at the end of July. Atlantic Refining Co. partially met the increase with a raise of 0.3 cent for all of its East Coast marketing territory. Socony-Vacuum Oil Co. announced increases in prices of kerosine, No. 2 fuel, and diesel oils averaging 0.5 cent a gallon. The new prices for the eastern seaboard area are effective August 14. The New York Harbor barge price for No. 2 fuel under Socony's new posting will be 8.5 cents, identical with the company's posting during September 1949.

Continuing high demand for kerosine and home-heating distillates in the Mid-Continent area stiffened the Group 3 tank-car market and brought increases in prices quoted for both products. The advance amounted to 0.125 cent a gallon on both the high and the low for kerosine and No. 2.

Regular-grade gasoline also moved up 0.125 cent on the low of the Group 3 market to 10.375 cents. Open market gasoline on Gulf-East Coast markets is somewhat easier with some regular-grade material available in New York Harbor at 12.5 cents.

REPRESENTATIVE QUOTATIONS

Representative spot-market quotation of leading suppliers as of August 14, 1950. Figures are f.o.b. plant for tank-car shipments in cents per gallon, except for residual fuel oil which shows the price per barrel and wax, in cents per pound.

GASOLINE, KEROSINE, AND FUEL OILS

	Mid-Continent Group 3	New York Harbor (barge)	Texas Gulf Coast
Regular gasoline, 80-82 octane	10⅜-10½	12.5-12.75	10¾-11½
Premium gasoline, 86-88 octane	11¼-11½	13.5-13.75	11½-12½
42-44 w.w. kerosine	8⅝-8¾	9.1-9.6	8¼-8½
No. 2 straw fuel oil	7¾-7⅞	8.0-8.5	7⅜-7½
No. 6 residual	$1.65-1.75	$2.15	$1.80-1.85

NATURAL GASOLINE

	Group 3	North Texas	N. La.
Grade 26-70	5⅞	5⅜	5⅝
Grade 18-55	7.05	6.55	6.80

LUBRICATING OILS

South Texas

200 vis., No. 2-3 neutral	12.5
750 vis., No. 3-4 neutral	14.75
2,000 No. 5-6 neutral	16.5

LUBRICATING OILS

Mid-Continent

150-160 vis., D bright stock, 0-10 pp.	21-22
200 vis., No. 3 neutral, 0-10 pp.	13.5-14.5

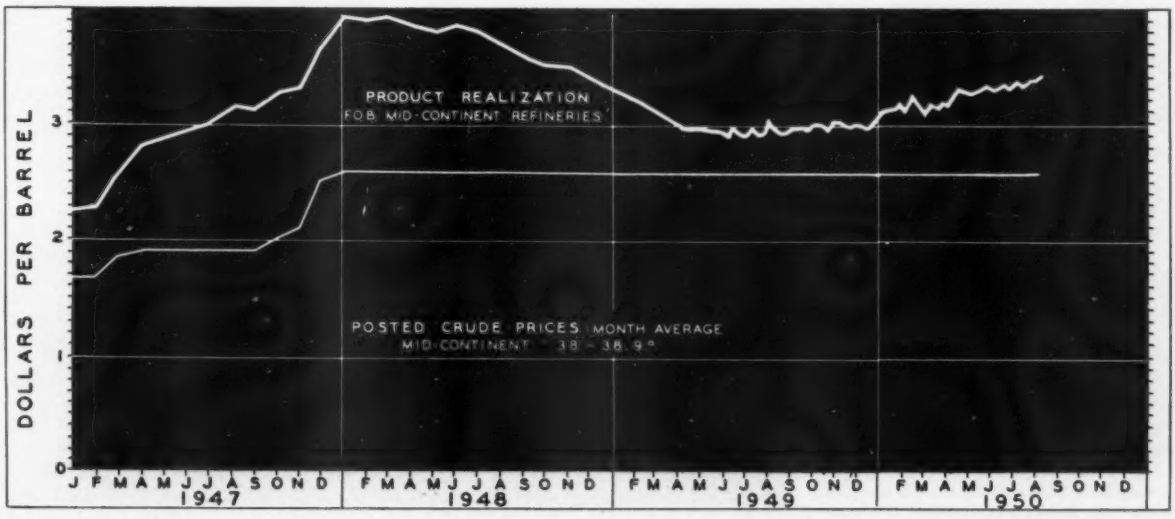
Western Pennsylvania

145-155 vis., 10 p.t. bright stock	27.5
180 vis., 0 p.t. neutral	28.5

WAX

Mid-Continent

132-134 A.M.P.	4.50



In this trend chart refinery realization is based on average Mid-Continent grade crude oil (not 38° gravity only) and average prices for refinery products as published in The Oil and Gas Journal basis Oklahoma (Group 3). Refinery yields confined to gasoline, kerosine, distillate, and fuel oil. Realization averaged $3.43 for week ended August 5, $3.39 for previous week, and $2.98 for August 1949.

XUM

EQUIPMENT MEN ... in the News

Kinney Appointed Republic Director of Purchases

H. C. KINNEY

H. Cooper Kinney has been appointed director of purchases of Republic Supply Co., according to an announcement by J. H. Lollar, Jr., president. R. E. McCullough will continue in his position as purchasing agent. Prior to his elevation Kinney had been manager of Republic's Gulf Coast district with headquarters in San Antonio. I. R. Knight, formerly Kinney's assistant, succeeds Kinney as district manager.

Kinney began with the company in 1917 in the sales department shortly after his graduation from Mississippi A. and M.

Green Fire Brick Names New Directors to Board

Three new members of its board of directors have been announced by A. P. Green Fire Brick Co., Mexico, Mo. They are: George C. Willson, attorney, of the law firm Willson, Cunningham & McClellan, associated with Green as general counsel since 1920; John R. Longmire, partner, I. M. Simon & Co., investment bankers; and William H. Peterson, Plainfield, N. J., who for the past 20 years has been president of Valentine Fire Brick Co., Woodbridge, N. J. This firm has recently been merged with Green and is now operating as a division of that company.

Western Opens Treating Station at Ulysses

Western Co., acidizing and perforating company of Midland, Tex., has established an oil and gas-well treating station in Ulysses, Kans., Walter Beadle, manager of Western's acidizing department, announced recently.

Jack Gordon has been named manager of the new station. Other key personnel include Merl Moore, senior treating engineer, and Harley Roche, truck foreman. Gordon was previously manager of Western's Odessa station. Moore and Roche were located at the company's station at Borger. The Ulysses Station, and a substation, which has been established in conjunction with it at Hooker, Okla., are an extension of Western's Panhandle-Kansas district, which is under the direction of District Manager C. E. (Spike) Inman.

National Tube Announces Executive Realignment

John E. Goble, president of National Tube Co., has announced the election of William F. McConnor as executive vice president of the company, and H. J. Wallace as vice president in charge of sales, succeeding McConnor in that position.

W. F. McCONNOR

H. J. WALLACE

Wallace then announced the appointment of William J. McKee, formerly sales manager, central area, as general manager of sales of National Tube, and of Louis W. Mason, formerly assistant general manager of sales, as sales manager, central area, succeeding McKee.

McConnor has been with National Tube since 1917. For 10 years prior to becoming vice president in charge of sales in 1946, he served as general manager of sales. Wallace has been general manager of sales since 1946. He joined the company in 1928.

McKee has spent his entire working career with National Tube, having joined the firm in 1912. Mason started his business career with Carnegie-Illinois Steel Corp., also a U. S. Steel subsidiary. He joined National Tube in 1923.

Merrill Elected President, Manning, Maxwell & Moore

Hamilton Merrill, a vice president and director of Manning, Maxwell & Moore, Inc., has been elected president of the company. The announcement was made recently by Colby M. Chester, chairman of the board of directors.

Merrill succeeds Robert Ross Wason, who died July 7, 1950. He became associated with M. M. & M. in 1920 as assistant works manager. In 1928 he became works manager of the Bridgeport plant; he was made a vice president in 1937 and was elected to the board of directors in 1949. In May of this year he was appointed vice president in charge of the Consolidated-Ashcroft-Hancock division of the company. Merrill is a graduate of Massachusetts Institute of Technology.

Subsurface Names Anderson As West Texas Manager

R. M. ANDERSON

Subsurface Engineering Co., Tulsa, has announced the appointment of Richard M. Anderson as West Texas district manager with offices in Midland, Tex. Anderson, a graduate of Carnegie Institute of Technology, was a production engineer with Stanolind Oil & Gas Co. before his present connection. Subsurface Engineering Co. has district offices at Oklahoma City and Lindsay, Okla.; Snyder, Midland, Premont, and Houston, Tex.

Texas Plant Acquired for Plastic Pipe Production

Carter Products Corp. has acquired this plant in Corsicana, Tex., for the production of Carlon flexible plastic pipe. Brigham Britton, Carter's president, in making the announcement, said the plant is scheduled to start operations within the next 30 days.

Maloney Opens New Tulsa Branch Office

F. L. MILL

E. W. UPTON

Frank H. Maloney, president of F. H. Maloney Co., has announced the opening of a new branch office of his company at Tulsa. Maloney said, "We find it advisable to immediately provide better liaison services between our customers and our factory."

F. H. Maloney Co.'s new Tulsa office will service customers in the Mid-Continent area of Oklahoma, Kansas, Missouri, and the adjacent territory. The Tulsa office is under the supervision of Frank L. Mill, district manager, who is well acquainted with the trade in that area, as well as in the Texas-Louisiana Gulf Coast territories. He attended both University of Houston and Rice Institute, majoring in chemical engineering.

Maloney also took this occasion to announce that Edward W. Upton recently has been retained as the general manager of F. H. Maloney Co. Upton was with Bryon Jackson Co.'s pump division for 15 years. He was manager of its Mid-Continent area until 1943 and then went to its New York City office as manager of the pump division.

Besides the Tulsa office, F. H. Maloney maintains a branch office in Los Angeles. The company's general offices and four factories have been located in Houston since 1932.

New Firm to Design Process Equipment

The formation of Russell Engineering Corp., with offices at Houston, has been announced by George F. Russell, president. The new firm is incorporated under the laws of Texas and will specialize in the design and engineering of natural-gas and petroleum-processing equipment.

Russell was formerly associated with Hudson Engineering Corp., Standard of New Jersey's Louisiana division, Phillips Petroleum Co., and Consolidated Western Constructors, Inc. For the past 2 years he has been a consulting chemical and petroleum engineer. He was assistant professor of chemical engineering at University of Oklahoma, and was associate professor of natural gas and petroleum engineering at Louisiana State University. Other officers of the new corporation are Warren N. Richey, vice president and chief engineer, and James M. Hoover, executive vice president and secretary-treasurer. Richey was formerly associated with Phillips Petroleum Co., Shell Oil Co., Hudson Engineering Corp., and lately with the F. S. West Co., with which firm he was chief engineer.

Hoover is a business administration graduate of Indiana University, and was formerly associated with Eastern Air Lines, Inc., Hudson Engineering Corp., and Gulf Oil Corp.

Cameron Iron Announces Appointment of Officers

J. S. Abercrombie, president, has announced that the board of directors of Cameron Iron Works, Inc., have made the following appointments: Ralph H. McCullough, secretary-treasurer; Edmond L. Lorehn, executive vice president; Herbert Allen, vice president and general manager; and Olle L. Lorehn, vice president and assistant to the general manager.

The board of directors are: Abercrombie, McCullough, Lorehn, Allen, and R. H. Abercrombie.

Continental Makes W. D. Craig District Manager

W. D. CRAIG

William D. Craig, formerly assistant district manager for Continental Supply Co. in charge of East Texas operations, has been made district manager for the Rocky Mountain district, with headquarters in Casper, Wyo.

James R. Chapman replaces Craig and will maintain headquarters in Tyler, Tex. He comes from the Casper store.

Enterprise Names Malone To Chicago Sales Staff

W. MALONE

Appointment of Wren Malone to the sales staff of the Chicago branch of Enterprise Engine & Machinery Co. has been announced by James E. Watson, general sales manager. Malone was recently regional manager of the Superior Engine Division of National Supply Co.'s Springfield, Ohio, branch. He will serve Enterprise in the Illinois, Ohio, Indiana, Michigan, and Wisconsin area.

Buffalo Bolt Co. Merges Affiliates

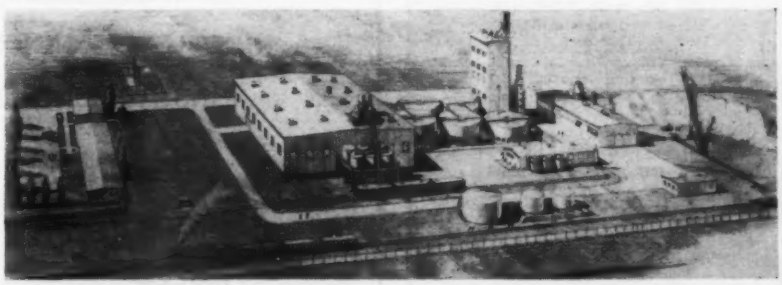
R. B. Flershem, president of Buffalo Bolt Co., has announced that the merger into Buffalo Bolt Co. of its operating affiliates, S. M. Jones Co. of Toledo, Eclipse Lawn Mower Co. of Prophetstown, Ill., and Penberthy Injector Co., of Detroit, has been consummated. The name of the company has been changed from Buffalo Bolt Co. to Buffalo-Eclipse Corp. These changes became effective July 31, 1950.

The operating units of the company now operate as divisions of Buffalo-Eclipse Corp. under their previous corporate titles which have been familiar in the trade for many years.

Officers of the new company will be: R. B. Flershem, president; C. L. Turner, vice president sales; S. P. Cary, vice president manufacturing; C. O. Cornell, vice president finance; M. B. Jones, vice president; C. Neal Turner and C. B. Johnson, vice presidents; S. C. Wead, secretary-treasurer; W. K. Jackson, H. J. McCallum, K. S. Moore, and F. S. Oatman, assistant secretaries.

(Continued on page 191)

Filtrol Building New Plant at Salt Lake City



This new plant being built by Filtrol Corp. at Salt Lake City will be capable of making a full line of Filtrol products but is especially designed for the manufacture of an improved catalyst for petroleum cracking, suitable for the manufacture of high-octane gasoline. The plant is scheduled for operation in January 1951. Manager of the plant will be Arthur D. Yates. Warren Havell will assist Yates as technical adviser.

XUM

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NOTICES

LIBERAL REWARD upon recovery for information leading to recovery of Bucyrus-Erie rig used in drilling Snowden & Clary well near Las Cruces, New Mexico. Herschbach Drilling Corp., 3733 Amherst, Dallas.

EQUIPMENT FOR SALE

FOR SALE: One Gumbo Buster 26" Oil Bath rotary table in good running condition. Attractive price. Melton Supply Company, Box 1360, Semniole, Oklahoma.

FOR SALE: 2000' rotary rig complete. Completely overhauled Sullivan Model 200 drill with 5 x 8 GD pump mounted on a White truck. KB7 International truck, pole trailer, drill pipe, light plant, tool house and tools. J. W. Byrd, 413 W. Hill, Oklahoma City, Okla.

WAR SURPLUS MACHINERY
Gaso, Byron Jackson, Aurora, Wayne, Lombard & Hale Fire Pumps with Engines, 1½ to 25 KW Generator Sets or Light Plants, Engines, Suction Hose, Fire Hose, Victaulic Couplings & Etc. Write for listing. H. A. McCarthy, 310 Thompson Bldg., Phone 5-3296, Tulsa, Oklahoma.

ALLIS-CHALMERS SERVICING UNITS: 2 Model U M Units mounted on International Trucks and 1 Model U E Unit mounted on International Truck. Units in good working condition. GLENN SUPPLY CO., Box 1104, Tulsa, Oklahoma.

FOR SALE

9—230 H.P. Bessemer Type 10 Engines with compressors, Steel Buildings, Valves and Fittings complete for installation. Located Salem, Illinois Oilfield.

ENGLE PETROLEUM, INCORPORATED
Box 655, Evansville, Indiana
Telephone 5-5179

NEW STEEL PIPE

20" OD with 5/16" wall, 20-40 foot lengths, 1200 feet.
24" OD with .281 wall, 40 foot lengths, 2000 feet.
24" OD with 5/16" wall, 20-40 foot lengths, 400 feet.
30" OD with ¼" wall, 20 foot lengths, 1000 feet.

Immediate delivery subject to prior sale.

Write—Wire—Phone

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Kansas City 18, Kansas
THatcher 9243

EQUIPMENT FOR SALE

FOR CABLE TOOLS
DEGEN PIPE AND SUPPLY CO.
Box 107, Red Fork Station, Tulsa, Oklahoma

FOR SALE at our Lacy Gasoline Plant Seminole County, 1 Braun Portable Distillation Unit, Size G, Serial #7190 complete with building, Cities Service Oil Company, Partridge, Bartlesville, Oklahoma.

1—36-L BUCYRUS ERIE Drilling Machine and 1—24-L. These machines are practically new and can be inspected on drilling sight. Contact R. F. McMahan, Taylor 7253 and Taylor 4116, Louisville, Kentucky.

Several Army Surplus 4½" x 6" Gaso Duplex 1860 Pumps—two piece skid mounted with Chrysler 8 cylinder engines. Will sell pumps only or complete units about half price.

H. H. COFFIELD
ATTN: W. H. Orr
Phones: 132—Rockdale, Texas
A-86064—Houston, Texas

SALT WATER PIPE

60c ft. 5⅛" x 4 9/16"
100 lb. Test
Roll or Bolted Couplings—$1 up

GOOD-ALL MFG. CO.
Ogalala, Neb.

EQUIPMENT FOR SALE

ASKANIA VERTICAL MAGNETOMETER, compensated, A-1 condition. Box D-628, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE

7—80,000 Barrel Tanks

CUSHING, OKLAHOMA

Ring 1 ¾"
Ring 2 5/8"
Ring 3 ½"
Ring 4 7/16"
Ring 5 3/8"
Ring 6 ¼"
Ring 7 13/64"

Bottom plates ¼"
Steel roof—Wood structure
Offered subject to prior sale.
Dismantling and re-erection service available.

Goldenstern & Stolper, Incorporated

Box 687 **Phone 6635**
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DULIEN STEEL PRODUCTS, INC.
of Washington
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COTTON VALLEY, LA.
PHONE: COTTON VALLEY 26

EQUIPMENT FOR SALE

FOR SALE near Blackwell, Oklahoma, one Rotary Rig Electric Generating Unit, 175 KW, 480 volt, powered by 2—150 hp. Sterling Gas Engines. Price $6500. Cities Service Oil Co., Patridge, Bartlesville, Okla.

FOR SALE: Wilson Giant draw works, powered by two JL-1335 Buda engines with Wilson chain compound. Unit completely overhauled. Can sell separate or with a complete rig. For information, call or write Melton Supply Company, Box 1360, Seminole, Oklahoma.

6500 GALLON

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For Immediate Delivery
at special low price.

Write—Wire—Phone

SONKEN-GALAMBA CORPORATION

2nd and Riverview (X-614)
Kansas City 18, Kansas
THatcher 9243

EQUIPMENT FOR SALE

FOR SALE: Failing "66" draw works, with 65′ tubular derrick, skid mounted, powered by Cummings Diesel engine. Ideal mud pump C-150—6¾″ x 12″, powered by D-13000 Caterpillar Diesel engine. 3500′ of 3½″ drill pipe. Failing block and swivel, B J hook, drill collars, kelleys, truck, float, car, two light plants, water pump, tank and line. This rig is complete in every detail with all tools and equipment—ready to move on location. Simmons & Wilson, Hotel Stockton, Ft. Stockton, Texas.

FOR SALE: Model 75 Wichita Trailer Type 3 drum-drilling and clean-out rig, A-mast, 120 HP Waukesha motor, 4500′ of ¾″ drilling & ½″ sand lines, dog house and drilling tools. J. W. Gookin, Box 641, Electra, Texas. Phone 560 or 1188.

FOR SALE: #3 National DRILLING MACHINE, complete with 12 x 12 floor sills, 3″ walk and floor, new bandwheel, casing rack, house, belt hall, steel mast, steel brake wheel with rotary block lined 12″ brake band, O.C.S. chain driven sand reel with 2 brakes and chain, turn buckles and guy lines complete, including string of drilling tools complete from 12″ to 6″ with Wilson elevators, dog house, tool boxes, light plant, water pump. Young Drilling TRANSMISSION complete with low gear box; H.X.C. Hercules dual ignition MOTOR, equipped for natural gas or butane-volume tank for same. Located at Bristow. Call or write R. R. Kirchner, Bristow, Oklahoma.

EQUIPMENT FOR SALE

WELL equipment. New and used spudders, rotaries, core drills, all sizes and types. Cable tools, drill pipe, bits, pipe. Fishing tools rented. Everything for well service. Pressey & Son, Pueblo, Colo.

FOR SALE, at Pampa, Texas: 3 Used #400 "A" Masts, 106,000# capacity, 60′ high, 8′ base. Price $350.00 each. Cities Service Oil, Patridge, Bartlesville, Oklahoma.

FOR SALE near Vernon, Texas: 1—40 HP Superior, 4 Cycle Gas Engine Driving Power Serial #18611, Cities Service Oil Company, Patridge, Bartlesville, Oklahoma.

USED ROTARY AND CABLE TOOL DRILLING TOOLS, WIRE LINES. E. A. KELLY, BOX 861, OKLAHOMA CITY. PHONE 5-6407.

FOR SALE: Drilling Rig: Brewster B0190 draw works W/NKU 210 H.P. Waukesha, 6x16 Gardner-Denver pump W/225 H.P. 6 cylinder LeRoy, with or without 5000′ 4½ drill pipe, now drilling 5000′ hole near Shreveport. Arthur Arnold, Box 3003, Shreveport, La.

FOR SALE: 300 Amp Westinghouse welding machine powered by 6-BK Waukesha engine. Completely overhauled. Less than 50% of new price. Melton Supply Company, Box 1360, Seminole, Oklahoma.

COMPLETE ROTARY DRILLING RIG: 2180′ 30′ good Hughes acme joints, 2⅞ nat. pipe, 50′ channel mast just completed, 2250 hole, good condition, ready to go. Now on steel frame and wheels, can be mounted on truck or float. Rig is now located 5 miles east of Coupland, Texas. For information write or see: J. H. Hanson, Route 4, Box 43, Elgin, Texas.

CORE-DRILL Equipment for Sale: Two "Franks" truck-mounted core drills, 2,000′ capacity, mounted on KR-11 International Trucks. Three 750 gallon water tanks, skid mounted. Contact Mr. J. D. Baker or Mr. W. H. Hawkes, P. O. Box 1654, Oklahoma City, Oklahoma. Telephone No. 2-6381.

FOR SALE: One 7¼ x 14 Whelan model 11000 Slush pump. New fluid end, gear box A-1. Melton Supply Company, Box 1360, Seminole, Oklahoma.

BARGAIN

3—100 HP Superior Twin Gas Engine COMPRESSORS—located in Oklahoma. Alfred B. Kern, 223 Wright Bldg., Tulsa, Oklahoma.

NEW LINE PIPE

300,000	ft.—	2⅜″	O.D. 3.65# Continuous Weld
100,000	ft.—	3½″	O.D. 7.57# Continuous Weld
200,000	ft.—	4½″	O.D. 10.79# Continuous Weld
75,000	ft.—	8⅝″	O.D. 24.69# Seamless
100,000	ft.—	10¾″	O.D. 28.04# Seamless
60,000	ft.—	12¾″	O.D. 37.45# Seamless
40,000	ft.—	16″	O.D. 52.35# Seamless

Specifications on above line pipe from 2⅜″ to 8⅝″ inclusive are API Grade B 5-L. Other sizes to 16″ inclusive API Grade B 5-LX-42. All pipe has Plain Ends beveled for welding.

This pipe has been purchased from one of the leading European mills who are licensed by the API to manufacture pipe under their specifications and use their monogram.

Delivery schedule to East or Gulf Coast is October, November and December, 1950. Further details on specifications, lengths, price, available upon request.

BOX D-639, THE OIL AND GAS JOURNAL
TULSA, OKLAHOMA

EQUIPMENT WANTED

WANTED: USED 4½″ DRILL PIPE
Box D-606, The Oil and Gas Journal, Tulsa, Oklahoma.

WANT TO BUY—Fractionating tower two to three feet diameter, 25 to 35 bubble trays approximately eighteen inch spacing. Access platforms desired. Air mail complete specifications and price. Julius Hyman & Company, Denver 1, Colorado.

HELP WANTED

REFINERY ECONOMIC ANALYST: Integrated petroleum company has opening for chemical engineer to supervise refinery economic analysis group. Position requires minimum of two years' experience in preparation of cost and process studies, familiarity with catalytic cracking, and at least one year of training in accounting and business administration. Age limits 25-35. Address replies to Box D-637, The Oil and Gas Journal, Tulsa, Oklahoma.

ESTIMATOR

Experienced ENGINEER familiar with Oil Refinery design and capable of estimating process equipment from flow diagrams.

Give full information, experience record and salary expected.

ARTHUR G. McKEE & CO.
2300 CHESTER AVE.
CLEVELAND 1, OHIO

FOR SALE

IMMEDIATE DELIVERY—SUBJECT TO PRIOR SALE
GAS GATHERING & FLOW LINE PIPE
NEW SEAMLESS, P.E., GOOD FOR 1200# p.s.i. AND OVER

20,000′ 2½″ OD x .280/.340″ Wall 7.31# 16′-30′, $69.50 CFT
15,000′ 3″ OD x .130/.160″ Wall 4.7# 14′-26′, $39.50 CFT
20,000′ 3¼″ OD x .130/.160″ Wall 5.1# 14′-24′, $46.50 CFT
25,000′ 4″ OD x .130/.160″ Wall 6.4# 14′-26′, $65.00 CFT
1,500′ 4″ OD x .500″ Wall 18.7# 18′-35′, $1.69 P/FT
60,000′ 5½″ OD x .160″ Wall Used 14′-20′, $89.00 CFT
1,250,000′ 6″ (6⅝″ OD x .280″ Wall) 18.97# 20′ RML Used #1 Lapweld, Beveled Ends. Available for inspection within 10 days and delivery 30 to 60 days. Price on request.
12,000′ 8⅝″ OD Casing shown below can be had P.E. if desired.

CASING

50,000′ 5½″ OD 10# New Seamless T&C Casing, 11½ V-Thread, 5⅝″ Collars (recommended for shallow wells up to 1,500′), $1.09 P/FT
6,000′ 8⅝″ OD 25# Used No. 1 Grade Lapweld T&C Casing, 8 V-Thread, 6″ Collars, $1.69 P/FT
6,000′ 8⅝″ OD 24# Used No. 2 Grade, Range 1, Lapweld T&C Casing, 6″ Collars, $1.35 P/FT

NEW AND GOOD USED SEAMLESS AND LAPWELD CASING AND TUBING AVAILABLE IN ALL DESIRABLE SIZES FOR IMMEDIATE DELIVERY, SUBJECT TO PRIOR SALE. WIRE OR PHONE COLLECT, SIDNEY 1791, FOR PRICES—ACT NOW!!!

A. J. STRUBEL
Sidney 1791 . . . 4946 Murdoch, St. Louis, Mo.

XUM

HELP WANTED

WANTED: One Geophysicist fully experienced in interpreting difficult seismograms and one Paleontologist preferably with experience in California, both for work in South America. Give full details experience, education, references and salary in first letter. Box D-630, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEERS, Executives, Technical Men. Salaried positions — $3600 to $30,000. This confidential service for outstanding men who desire a change of connection will develop and conduct preliminary negotiations without risk to present position. Send name and address for details. Tomsett Associates, 1204 Berger Bldg., Pittsburgh 19, Pa.

DRILLING COMPANY now operating in Permian Basin has opening for capable contact man or person in position to obtain contracts. Salary or interest basis. Replies confidential. Box D-641, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM Engineer or Geologist with experience in evaluation and subsurface studies in Gulf Coast wanted by sound independent. Age 30-45. In application state salary expected and enclose college transcript. Box D-631, The Oil and Gas Journal, Tulsa, Oklahoma.

ESTABLISHED Seismograph Company has opening for Party Chief. Two years minimum experience in charge of party and college degree in science or engineering required. This job offers adequate salary and profit sharing plan. Reply Box D-563, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN and Domestic Oil Employment Directory covering the oil industry, showing where to apply for jobs. Price $5.00. Oil Industry Mailing List, Box 2603, Tulsa, Okla.

HELP WANTED

Mechanical Draftsman, piping, concrete, pressure vessels, strength of materials. Furnish complete data, salary requirement, military status and sample of work.

Personnel Department, Cities Service Oil Company, Bartlesville, Oklahoma

SALES ENGINEERS
OPERATIONS SUPERVISORS
PERFORATOR OPERATORS

Only Experienced Men Need Apply.

WRITE ONLY

WELEX JET SERVICES, INC.
3909 Hemphill Street, Fort Worth 9, Tex.

PETROLEUM ENGINEER

An expanding volume of business has created a desirable position for a man of considerable experience in heater design for the oil and chemical industries. Reply by letter giving experience, education and salary desired.

BELAS CORPORATION OF AMERICA
Erie Ave. & "D" St., Phila., 34, Pa.

SITUATIONS WANTED

GEOLOGIST, aged 35, 6 years' experience subsurface work with major company, desires position with aggressive independent. Box D-617, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE MECHANICAL ENGINEER: 38, with 9 years design and development experience on oil field equipment—5 years drilling and production experience. Good record and capacity to develop and create new ideas. Desire position with good opportunities with equipment or service company. Box D-624, The Oil and Gas Journal, Tulsa, Oklahoma.

AUDITOR-OFFICE MANAGER, CPA, Fifteen years experience, accounting and taxes, principally oil industry. Desires change. Box D-640, The Oil and Gas Journal, Tulsa, Oklahoma.

INDUSTRIAL TRAINER or Personnel Relations Director: 15 years successful experience with major oil companies. B.A., M.A. degrees. Available on consulting or permanent basis. Box D-620, The Oil and Gas Journal, Tulsa, Oklahoma.

SITUATIONS WANTED

DRILLING Contractor operating in West Texas and New Mexico desires to contact small or medium-sized independent oil company who needs an operating manager. Personal interview desired. Twenty years experience in all phases of the oil industry. Address replies to Box D-644, The Oil and Gas Journal, Tulsa, Oklahoma.

ENGINEER, experienced in preparation of accurate cost estimates from flow diagrams for refinery construction, also job cost control methods, available for limited time employment anywhere. Box D-636, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED SALESMAN with Rocky Mountain acquaintance desires job to headquarter in Denver or Casper. Box D-642, The Oil and Gas Journal, Tulsa, Oklahoma.

EXPERIENCED Petroleum Engineer-Geologist desires connection with active independent. Ten years with major companies and private practice in executive supervision of drilling, completion, production, geological and reservoir evaluation work. Prefer interest participation. Excellent references. Box D-632, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER, with 10 years much varied experience in production, drilling, and well completions, now engaged in responsible position with major company, desires association with progressive independent. Age 31, family, best references. Box D-638, The Oil and Gas Journal, Tulsa, Oklahoma.

CHEMIST-GLASSBLOWER: Fifteen years refinery and gasoline plant experience, including supervision, laboratory, gas analysis, water treating and plant processing. Speak Spanish, would consider foreign employment. Available October 1. Box D-635, The Oil and Gas Journal, Tulsa, Oklahoma.

CANADIAN, College graduate, seven years drilling, production engineering Canada, Texas, Venezuela, desires active development work foreign or domestic. Would consider tool, service or supply company position. Age 33, married, 3 children. Box D-634, The Oil and Gas Journal, Tulsa, Oklahoma.

GRADUATE GEOLOGIST, experienced home and abroad, desires position in New York City. Box D-621, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTENTION: Well established oil well drilling contractor desires to manage and supervise: Individuals', groups', small or medium-sized oil companies' drilling, production and operating problems in Central and Western Texas, and New Mexico Personal interview by appointment is desired. Makin Drilling Company, Box No. 131, Ph. No. 131, Hobbs, New Mexico.

MECHANICAL ENGINEER and technical writer, 26, three years engineer in gas industry; design stations, piping, exchangers, gasoline plants; desires New York location. 7312 Main St., Kansas City 5, Mo.

GRADUATE GEOLOGIST, experienced, desires connection with Independent. Box D-623, The Oil and Gas Journal, Tulsa, Oklahoma.

LEGAL BLANKS

BURKHART LEGAL BLANKS since 1908. Oil-Gas (all states), Business, Real Estate, Legal Forms, Leases, Revised With Government Regulations, Commercial Printing, Catalog and Samples on request. Burkhart Printing & Stationery Company, 115 South Cincinnati, Tulsa, 3, Oklahoma.

BUSINESS OPPORTUNITIES

WILL trade my 80,000′ of 5½" and 6⅝" OD casing and tubing for interest in semi-proven or proven oil deal. Call or write M. B. Rudman, 816 Mercantile Bank Bldg., Dallas, Texas.

UNUSUAL Opportunity: For Sale, Complete Theatre Circuit of 9 Suburban Theatres in best Port City in the South, Complete organization, to step in, most efficiently staffed, Several New De Lux Houses, all property clear, will take 100,000.00 dollars to handle, balance in 20 years, with 20 year lease, at low rate. Will stand most rigid investigation. Box D-608, The Oil and Gas Journal, Tulsa, Oklahoma.

ROYALTIES

DEEDED ROYALTIES
San Juan Basin & Permian Basin. Write Harry S. Wright, Wright Bldg., Farmington, New Mexico.

ELK CITY POOL—(Oklahoma)
Royalties at bargain. A. S. Berry, owner, 522 Wright Building, Tulsa, Oklahoma. Phone 5-5402. Investors with capital solicited for purchases in pool and trend.

WANTED
PRODUCING ROYALTIES
BOX 591, HOUSTON, TEXAS

ROYALTY FOR SALE: Near Magnolia Parks new major multipay discovery oil well, Midland County, Texas. The discovery has proven production by drill-stem tests in Pennsylvanian, Silurian and Ellenburger. Possible production two other zones. This royalty is an excellent buy at asking price. For full information write Louis Egan, 208 Empire State Bank Building, Dallas, Texas.

FOR SALE: Gas well royalties of 1/16th in five producing wells. Write John R. Hahn, 3715 Carew Tower, Cincinnati, Ohio.

MONTANA ROYALTIES
Millions of acres now leased by world's major companies, with huge drilling play in prospect. For booklet describing Montana geology and oil development, write Landowners Royalty Company, Box 1225, Great Falls, Montana.

LEASE AND DRILLING BLOCKS

SHALLOW Production, Allen County, Kentucky, 11 Pumping Wells—10 bbls. per day. 18 Wells to Recondition. Joseph Thomas, 50 Radnor Circle, Grosse Pointe Farms 30, Michigan.

SECONDARY RECOVERY; 20 wells 300 acres, Red Fork and Bartlesville sands, 1000 ft. depth. Want development on percentage or override basis. Box D-643, The Oil and Gas Journal, Tulsa, Oklahoma.

TEN thousand acres leases on axis of former U.S. Petroleum Reserve, Rocky Mountain Region. Oil seeps from untested Madison, Devonian and Ordovician formations. Will make attractive deal. Box D-627, The Oil and Gas Journal, Tulsa, Oklahoma.

SCURRY COUNTY: Have leased two lots 50 x 140 north outskirts Snyder. Want bonus, drilling agreement and override. V. A. Epps, Pioneer Hotel, Tucson, Arizona.

MISSISSIPPI
North-Central GUSHERS. North-eastern shallow. Will block your favorite spot 5,000 to 10,000 acres. 25 wells drilling this year. Bank references and quick action. Leases your bank with draft attached. Blocking, buying, drilling Arkansas, Louisiana, Tennessee, Kentucky. Gilt-edge organization. OIL, 1369 Court. Memphis, Tenn.

LEASES ROYALTIES

Producing and Nonproducing
Bought and Sold—Any Area
Inquiries Invited

B. D. BUCKLEY
6376 Clayton Road, St. Louis 17, Mo.

TO LEASE FOR OIL AND GAS
640 ACRES IN
REAGAN COUNTY

Five Miles Southwest of Stiles, Texas
Survey 1203 G.C.&S.F.R.R.
Patent #129
Block 4/1040
Three Miles North of University Land

To Lease With Understanding to DRILL Within 2 YEARS

Write for further information and state any reasonable proposition to:

W. H. BRITTON—P. O. Box 1207
Grand Central Station, New York, N. Y.

WANTED

WANTED: Small producing oil royalties. Also drilling deals. Navarro Royalties Company, Odessa, Texas.

WANTED: Proven leases and producing acreage 20 barrels or more daily. Please submit price and full particulars. Sierra Corporation, 1001 Commerce Bldg., Kansas City 6, Missouri.

WANTED: SURPLUS Chemicals, Oils, Waxes, Solvents, Wastes and Residues of all kinds. Chemical Service Corporation, 98-06 Beaver St., New York 5, N. Y.

PATENT ATTORNEYS

PATENT Practice before U. S. Patent Office. Validity and Infringement Investigations and Opinions. Booklet and form "Evidence of Conception" forwarded upon request. Lancaster, Allwine & Rommell, Registered Patent Attorney, Suite 418, 815-15th Street, N.W., Washington 5, D. C.

MANUFACTURERS REPRESENTATIVE

Experienced, Qualified, and Capable SALES REPRESENTATION

in Texas, Louisiana, or Gulf Coast areas for manufacturers of Drilling and Production Equipment. Please write describing products, also territory and type contract available.

ROUNDUP OIL TOOL COMPANY
3003 Louisiana Street, Houston 6, Texas

REAL ESTATE

DO YOUR WANT TO RETIRE TO THE DELIGHTFUL OZARKS?

For sale by owner, good six room home on 185 foot by 190 foot tract. Natural gas. Fine water. All city convenience. Garden, small fruits, wonderful shade trees. Mild climate. Write P. O. Box 385, Rogers, Arkansas.

EQUIPMENT MEN

(Continued from page 187)

Hammond Opens Fabricating Plant at Bristol, Pa.

Sixteen acres of completely new and modern plant, with main-line railroad siding and near deep-water docks for marine transportation, almost doubles the fabricating capacity of Hammond Iron Works at Bristol, Pa.

A feature of the new fabricating equipment in this plant is a planner with a 60-ft. bed for gang planing the largest size steel plates.

The size, fabricating equipment, and location, between New York and Philadelphia, of this new plant now enables Hammond to fabricate storage tanks, stacks, standpipes, breechings, steel and alloy plate, etc., of all sizes and design for erection in any part of the world.

R. E. Smith Named Export Manager for Advance

Waldo Moore, manager of the Advance Oil Tool Co., manufacturers of the Advance air-powered tubing spider, has announced the appointment of Roland E. Smith, Los Angeles, as export representative for the company's products.

LEGAL

90,067.45 acres of Tribal and 39,044.42 acres of allotted Indian lands located in T. 13 N., Rs. 22 and 23 E.; T. 14 N., Rs. 21, 22, and 23 E.; T. 15 N., Rs. 21, 22, and 23 E.; T. 16 N., Rs. 20, 24, 25, 27, 28, 30, and 31 E.; T. 17 N., Rs. 19, 20, 23, 24, 28, 29, 30, and 31 E., B.H.M. in the Cheyenne River Indian Reservation, South Dakota, are being advertised for oil and gas leasing, bids on which will be opened August 16, 1950, at 2:00 P.M. C.S.T. at the office of the Superintendent of the Cheyenne River Indian Agency, Cheyenne Agency, South Dakota. Full descriptions and copies of the advertisement may be obtained from the Superintendent, Cheyenne River Indian Agency, Cheyenne Agency, South Dakota, or from the Oil and Gas Supervisor, U. S. Geological Survey, Federal Building, Casper Wyoming.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Wind River Indian Agency, Fort Washakie, Wyoming, August 4, 1950. Notice is hereby given that Sealed Bids will be received until 2:00 p.m. September 5, 1950, and opened at that time in the Office of the Superintendent of the Wind River Indian Agency, Fort Washakie, Wyoming, for the leasing of the following unit of tribal land located in Fremont County, Wyoming, for oil and gas mining purposes. UNIT NO. 1: E½ SW¼, S½ NE¼ Section 8, W½ W½ Section 17, W½ W½ Section 20, W½ NW¼, S½ Section 29, all in Township 1 South, Range 5 East, W.R.M., containing 880 acres more or less. The foregoing unit of tribal land is being offered as a single unit, and a lease will be drawn on the applicable Government form. The right is reserved to reject any and all bids. The successful bidder will be required to pay the cost of advertising. The lessee must pay as advance rental $1.25 per acre per annum. The lease will be sold to the highest bidder for a bonus offer upon an acreage basis in addition to the royalty of 12½%. The successful bidder must deposit with the Superintendent of the Wind River Indian Agency, on the date of the sale, a certified check or bank draft on a solvent bank in an amount equal to 20% of the bonus bid and of the first year's rental, as a guaranty of good faith. The check is to be made payable to the TREASURER OF THE UNITED STATES. The lessee will be required to use diligence in drilling and producing operations and the lessee alone or in conjunction with other lessees in the area shall commence the drilling of a test well within one year from date of approval of the lease and diligently continue drilling to test to the satisfaction of the U. S. Geological Survey the oil producing possibilities of the formations to a depth of 5,000 feet or to the Mesaverde sands, unless oil or gas in commercial quantities is found at a lesser depth, or, in lieu thereof, to drill two or more test wells with an aggregate drilled footage of 5,000 feet and each succeeding well to be started within six months of the approved abandonment of the previous test well. The lease must be completed and filed with the Superintendent within 20 days from the date it is received by the lessee for execution and returned with the remainder of the bonus bid, the balance of the first year's rental, a filing fee of $10.00, and the cost of the printed forms. Failure in any of these conditions may subject the bid to cancellation without further notice and forfeiture of payments already made. The lease on the above tribal unit will be drawn pursuant to the Act of May 11, 1938 (52 Stat. 347) and the regulations, Part 186, Title 25, C.F.R. The lease issued pursuant to this notice will be made for a term of ten years from the date of approval by the Commissioner of Indian Affairs and as long thereafter as oil and/or gas is produced in paying quantities. The rate of royalty will be 12½% of the value of all oil, gas, and/or natural gasoline, unless the lessor, with the approval of the Commissioner of Indian Affairs, elects to take royalty in kind. The adequacy of the bonus offer will be determined by the U. S. Geological Survey. A suitable bond will be required, and such bond must be approved by the Commissioner of Indian Affairs. The responsibility of complying with any requirements of the Federal Documentary Stamp Statutes will be left with the successful lessee. All bids should be addressed to the "Superintendent, Wind River Indian Agency, Fort Washakie, Wyoming" in a plain envelope marked: BID FOR OIL AND GAS MINING LEASE, RIVERTON DOME, TO BE OPENED AT 2:00 P.M. SEPTEMBER 5, 1950. For further information call or write the Superintendent of the Wind River Agency, J. M. Cooper, Superintendent.

CALENDAR

August

Western Petroleum Refiners Association, regional-technical meeting, Leonard Refineries Auditorium, Alma, Mich., August 28.

September

Tri-State Oil Show, Grayville, Ill., September 2-4.

American Chemical Society, 118th national meeting, Stevens Hotel, Chicago, September 3-8.

American Association of Petroleum Geologists and Society of Exploration Geophysicists, regional meeting, jointly with Geological Association of Canada, Banff Springs Hotel, Banff, Alta., Canada., September 5-8.

National Chemical Exposition, Chicago Coliseum, Chicago, September 5-9.

American Institute of Chemical Engineers, regional meeting, Minneapolis, September 10-13.

Instrument Society of America, national exhibit and technical meeting, Coliseum, Houston, September 10-14.

American Petroleum Institute, Division of Transportation, Subcommittee on Products Pipe Line Technology, Lennox Hotel, St. Louis, Mo., September 11-13.

American Society of Mechanical Engineers, and Instrument Society of America, Municipal Auditorium, Buffalo, N. Y., September 11-15.

National Petroleum Association, Hotel Traymore, Atlantic City, N. J., September 13-15.

National Association of Corrosion Engineers, Shreveport section, school meeting, Caddo Hotel, Shreveport, September 13-15.

American Petroleum Institute, Lubrication Committee, Hotel Traymore, Atlantic City, September 14.

Instrument Society of America, annual instrument conference and exhibit, Municipal Auditorium, Buffalo, N. Y., September 18-22.

American Society of Mechanical Engineers, fall meeting, Hotel Sheraton, Worcester, Mass., September 19-21.

American Society of Mechanical Engineers, petroleum mechanical engineering conference, Roosevelt Hotel, New Orleans, September 24-28.

Ohio Mineral Industries Conference, sponsored by Ohio State University and Ohio Department of Natural Resources, Ohio Museum Auditorium, Columbus, September 25-26.

October

Independent Petroleum Association of America, annual membership meeting, Jefferson Hotel, St. Louis, October 2-3.

American Gas Association, annual convention, Atlantic City, N. J., October 2-6.

Mid-Continent Oil and Gas Association, Texas division, Dallas, October 4-5.

Petroleum Branch, American Institute of Mining and Metallurgical Engineers, Mid-Continent meeting, Roosevelt Hotel, New Orleans, October 4-6.

American Association of Oilwell Drilling Contractors, annual meeting, Mayo Hotel, Tulsa, October 9-10.

Instrumentation for the Process Industries, fifth annual symposium, Texas A. & M. College, College Station, Tex., October 11-13.

Petroleum Branch, American Institute of Mining and Metallurgical Engineers, West Coast meeting, Elks Club, Los Angeles, October 12-13.

Oil Progress Week, October 16-21.

American Association of Petroleum Geologists, Pacific Section, Ambassador Hotel, Los Angeles, October 19-20.

Society of Economic Paleontologists and Mineralogists, Pacific Coast Section, Ambassador Hotel, Los Angeles, October 19-20.

Society of Exploration Geophysicists, Ambassador Hotel, Los Angeles, October 19-20.

Permian Basin Oil Show, Odessa, Tex., October 19-22.

Independent Natural Gas Association of America, annual meeting, Shamrock Hotel, Houston, October 23.

National Lubricating Grease Institute, an-

XUM

nual meeting, Edgewater Beach Hotel, Chicago, October 30-November 1.

November

Mid-Continent Oil and Gas Association. Louisiana-Arkansas Division, annual meeting, Roosevelt Hotel, New Orleans, November 2-3.

Society of Automotive Engineers, Fuels and Lubricants meeting, Mayo Hotel, Tulsa, November 9-10.

California Natural Gasoline Association, Silver Anniversary, Los Angeles, November 9-10.

American Petroleum Institute, annual meeting, Biltmore and Ambassador Hotels, Los Angeles, November 13-16.

American Society of Mechanical Engineers, annual meeting, Grand Central Palace, New York, November 27-December 1.

December

American Institute of Chemical Engineers, annual meeting, Columbus, Ohio, December 3-6.

Interstate Oil Compact Commission, winter meeting, Shamrock Hotel, Houston, December 11-13.

NOMADS

Tulsa Nomads, third Friday of each month. After Five Room, Tulsa Hotel.

Dallas-Fort Worth Nomads, first Monday of each month, Greater Dallas Club.

Houston Nomads, second Monday of each month. Ye Ole College Inn, Houston.

Los Angeles Nomads, second Wednesday of each month. Jonathan Club.

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that the NW¼NW¼ sec. 23, T. 20 S., R. 28 E., N.M.P.M., New Mexico, within the known geologic structure of the Russell field, will be offered for oil and gas leasing, through competitive bidding, at 1 p.m. Eastern Standard Time, September 6, 1950, when bids will be opened. The details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to the Manager of the Land and Survey Office, Santa Fe, New Mexico, or to this office. Marion Clawson, Director.

LEGAL

UNITED STATES DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that the NE¼SE¼ sec. 20, T. 24 N., R. 1 W., M.M., Michigan, 40 acres within the known geologic structure of the St. Helens field, undefined, (also known as Richfield field), will be offered for oil and gas leasing through competitvie bidding at 1 p.m., Eastern Standard Time, September 6, 1950, when bids will be opened. Details of the lease offering and how and where to file bids may be obtained by addressing an inquiry to this office. Marion Clawson, Director.

LEGAL

Western Washington Indian Agency, Tulalip, Washington. Notice is hereby given that sealed bids will be received until 2 o'clock, P. M., Pacific Standard Time, September 14, 1950, for oil and gas lease from the highest responsible bidder for a cash bonus in addition to the stipulated rentals for the following described allotted trust land, located in Grays Harbor County, State of Washington, to-wit: Government Lots 3 and 4, Sec. 15, T. 18 N., R. 12 W., W. M., containing 80 acres, more or less. The lease is offered subject to acceptance of the bonus bid by the Indian lessors and approval by the Commissioner of Indian Affairs. The right is reserved by the Commissioner of Indian Affairs to reject any and all bids and to disapprove and reject prior to approval any lease made on an accepted bid. For detailed terms of sale, and bond requirements, write the Acting Superintendent, Western Washington Indian Agency, Tulalip, Washington.

ADVERTISERS

Aetna Ball and Roller Bearing Company 19
Alten's Foundry & Machine Works, Inc. 163
Aluminum Co. of America 26
Avondale Marine Ways, Inc. 133

Baker Oil Tools, Inc. 113
Baldwin-Duckworth Division of Chain Belt Company 175, 176
Barrett Division of Allied Chemical & Dye Corp. 149
Beech Aircraft Corp. 12
Bethlehem Supply Co. 1
Bonney Forge & Tool Works 102
Bovaird Supply Co., The 42
Bowser, Inc. 180
Boyd Co., Clarence L. 151
Brown & Root, Inc. 2
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LEGAL

UNITED STATES DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that three units of land containing in all 440 acres in T. 15 S., R. 11 E., S.L.M., Utah, within the known geologic structure of the Farnham field, will be offered for oil and gas leasing, through competitive bidding, at 1 p. m., Eastern Standard Time, August 30, 1950, when bids will be opened. Details of the lease offering, how and where to file bids, and a description of the lands may be obtained by addressing an inquiry to the Manager of the Land and Survey Office, Salt Lake City, Utah, or to this office. Marion Clawson, Director.

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